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INDIA RUBBER WORLD

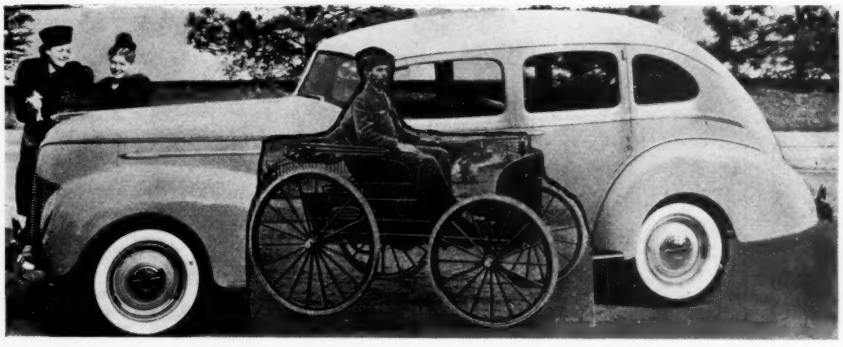
Published at 420 Lexington Avenue, New York, N. Y.

Volume 99 **New York, December 1, 1938** **Number 3**

The Rubber Industry Moves Onward—I

Research Increases Knowledge of Rubber's Capabilities, Prolongs Serviceability, and Extends Application to Broader Fields

S. C. Stillwagon



Pneumatic Tire Equipped 1895 Duryea and 1939 Hudson

MEMBERS of an industry frequently become engrossed in their particular sphere of operation and become unmindful of the existing enlargement of product application which necessarily takes place if that industry is showing progress. Representative consumers of rubber products regard rubber as a finished article and do not realize that thousands of formulas incorporate hundreds of ingredients to produce an almost infinite number of physical property combinations which in turn permit the wide usage of rubber in product form. Because of extensive research rubber has contributed substantially to the advancement of the standards of living.

Estimated as having more than 30,000 uses, rubber is now employed in services as divergent as are performed by the small stopper in Lyophile serum containers for storing dry biologics, the comparatively small vibro-insulators in which rubber in shear supports machines weighing 80 tons, or the endless conveyer belt 48 inches wide by 9,700 feet long and weighing 80 tons which at the site of the Grand Coulee dam travels at a speed of 450 feet per minute to move 2,000 tons of aggregate per hour. Perhaps rubber's greatest single contribution has been to automotive transportation through the evolution of the present pneumatic tire which now costs only one-fourth as much as in 1914, yet delivers ten times as much mileage with far greater comfort and safety. Approximately 56,000,000 tires were sold by manufacturers in 1937. During the past decade rubber has come to perform essential functions in many parts of the modern automobile. Since there are 30,000,000 automobile owners in the United States, the influence of rubber is widespread.

Because of fluctuating raw material prices, general curtailment of purchases, and the absence of truly comparative annual statistics it is impossible to interpret correctly the annual gross sales for rubber products so as to indicate the actual basic growth of the industry. However it is of interest that from 1925 to 1929 inclusive the total sales value of manufactured rubber products shipments was well over one billion dollars and in 1926 hit a peak figure of $1,206,022,000. According to statistics compiled by the same source, The Rubber Manufacturers' Association, Inc., the total net sales value for 1937 was $670,153,000.

Perhaps the most satisfactory means of comparing production activities in the industry and of showing the trend by various product groups is to use the crude rubber consumption as an indicator. In contrast to the above sales data, which showed a large decline for 1928 to 1937, the total crude rubber consumed in the U. S. A. increased from 384,644 long tons in 1925 and 442,227 in 1928 to 575,000 in 1936 and 543,600 in 1937. Probably owing to the lower price of crude rubber the consumption of reclaimed rubber decreased from 223,000 long tons in 1928 to 141,486 long tons in 1936 and 162,000 long tons in 1937. Even if it is assumed that this decrease in reclaimed rubber should be applied toward offsetting the increase in crude rubber consumption, there still remains an appreciable net increase in total crude and reclaimed rubber, thus indicating greater production activity in 1936 and 1937 than in 1928.

Usage by Product Groups

The accompanying table shows the trend of rubber consumption for various product groups during the past 15 years and further reveals the relative decline that has taken place in the amount of rubber consumed for tires and tire sundries from 1928 to 1937 inclusive. Most of the other groups have shown marked increases during this period, and the total consumption by groups other than tires and affiliated products is now 72% higher, in relation to total rubber consumed, than in 1928. Mechanical rubber goods, many of which go into automotive construction, are now consuming twice as much rubber as in 1928. Sponge rubbers, which are being used extensively for upholstering and cushioning purposes, have doubled their relative consumption of rubber in the past four years. Hard rubber products, which declined markedly in relative importance prior to 1928, have since doubled their consumption in the face of intensive competition from the new plastics. Boots and shoes, a large consumer of rubber, have held a relatively stable position during the past decade and a half. Other non-tire lines are apparently expanding as evidenced by the figures in the table. Perhaps the most interesting figures in the tire group are those of solid and cushion tires, which are now consuming only 0.25% of the total crude rubber as compared with 7.44% in 1922. Also remarkable is the large increase in the use of rubber for bicycle tires, brought about by the recent revival of bicycling interest and the wide adoption of balloon tires.

Rubber and Transportation

Airplanes, trains, boats, and automobiles, all utilize

PER CENT. OF TOTAL CRUDE RUBBER CONSUMED BY STANDARD PRODUCT GROUPS IN THE U. S. A.

Product	1922	1925	1928	1931	1934	1935	1936	1937
Tires and Tire Sundries								
All Types of Pneumatic Casings Not Recorded Below	57.60%	60.40%	66.70%	66.52%	65.60%	64.80%	64.90%	63.05%
All Types of Pneumatic Tubes Not Recorded Below	14.90	16.60	13.90	12.60	10.42	9.73	9.56	9.50
Motorcycle Tires (Casings and Tubes)	.17	.11	.10	.08	a	a	a	a
Bicycle Tires Including Juvenile Pneumatics (Single Tubes, Casings, and Tubes)	.35	.23	.24	.29	.47	.52	.74	.67
Airplane Tires and Tubes	.21	negligible	.03	.03	.03	.03	.04	.04
Solid and Cushion Tires for Highway Transportation	7.30	5.20	3.01	.93	.32	.26	.11	.11
All Other Solid and Cushion Tires	.14	.13	.16	.09	.10	.09	.17	.14
Tire Sundries and Repair Materials	.90	1.22	1.48	1.13	1.87	1.91	1.46	1.73
Total—Tires and Tire Sundries	81.57	83.89	85.62	81.67	78.81	77.34	76.98	75.24
Other Rubber Products								
Mechanical Rubber Goods	6.10	5.30	4.40	5.63	7.87	9.21	9.83	10.67
Boots and Shoes	4.70	3.70	4.15	3.54	4.38	4.32	4.70	4.62
Insulated Wire and Cable Compounds	.86	.92	.85	1.15	.79	1.11	1.42	1.65
Druggists' Sundries, Medical and Surgical Rubber Goods	.98	.68	.39	.51	.77	.81	.71	.86
Stationers' Rubber Goods	..	..	.31	.39	.38	.40	.44	.46
Bathing Apparel	..	..	.15	.26	.30	.19	.22	.22
Miscellaneous Rubber Sundries	..	..	..	..	.78	.76	.70	.70
Rubber Clothing	1.05	.76	.31	.29	.17	.24	.12	.13
Automobile Fabrics			.24	.21	.28	.16	.11	.10
Other Rubberized Fabrics			.55	.78	1.05	.97	.92	.92
Hard Rubber Goods	.90	.71	.27	.32	.49	.48	.49	.57
Heels and Soles	2.34	2.32	1.37	2.82	2.88	2.44	1.93	2.21
Rubber Flooring	..	.19b	.26	.33	.19	.19	.22	.26
Sponge Rubber	..	..	..	..	.39	.87	.69	.94
Sporting Goods, Toys and Novelties	..	..	.34	.67	.47	.51	.52	.45
Miscellaneous, Not Reported in Above Classifications	1.50	1.53	.79	1.43	..	..	..	..
Total—Other Rubber Products	18.43	16.11	14.38	18.33	21.19	22.66	23.02	24.76
Grand Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total Crude Rubber Consumed by Reporting Companies—Long Tons	254,183	353,873	406,849	318,949	420,591	420,845	454,037	437,706
Total Crude Rubber Consumed in U. S. A.—Long Tons (c)	.....	384,644	442,227	348,986	469,484	448,116	575,000	543,600

a. Included above with all types of pneumatic casings and tubes.
b. Last three quarters of year only.
c. Corrected to 100% from estimate of reported coverage.

Note: The percentage figures in this table were computed from crude rubber tonnage figures compiled by The Rubber Manufacturers Association, Inc. Inasmuch as the figures do not represent a 100% coverage of the industry, the percentages are not exact for the industry as a whole. They are, however, based on sufficiently complete data to show the trend of crude rubber usage.

A Few of the Many Diversified Uses of Rubber

A—Rubber Cushioned Wheel for Street Cars (*Goodrich*); B—Bus Hinged at Center with Rubber Hood (*Twin Coach Co.*); C—Surfacing Road with Aggregate and Rubber-Asphalt Mixture (*Limmer & Trinidad Lake Asphalt Co.*); D—High-Speed Tractor with Rubber Tracks (*Goodrich*); E—Double-Cavity Inner Tube (*Goodyear*); F—Sponge Rubber Display Letters (*Besbee Products*); G—Rubber Clothes Pin (*John G. Roberts*); H—Hot Water Bottle Decorated by Rubber Decalcomania Process (*Meyercord*); I—Rubber Dinosaur for Circus Parades (*Goodyear*); J—Rubberized Fabric Advertising Balloon (*Goodyear*); K—Comparison of 24.00-32 Truck Tire with 6.00-16 Passenger Car Tire (*Goodyear*); L—Rubber Cutless Bearing for Marine Use (*Goodrich*); M—Marsh Buggy (*Aluminum Co.*); N—Rubber Coated Diving Suit (*Collord*); O—Rubber Tile Flooring (*Armstrong Cork*); P—Rubber Croquet Mallet and Ball (*Goodrich*); Q—Tire for 40-Passenger Super-Transport Plane (*Goodrich*); R—Roller Skates Cushioned with Rubber Tires and Rubber Sole and Heel Pads (*Metal Specialties*); S—Rubber Tired Concrete Buggies (*Austin Co.*); T—Chemically Inflated Life Preserver Belt (*Clarence V. McGuire*); U—Pneumatic Tire Used as an Auto Trailer Coupler (*Aerocar Co.*); V—Ebonite Articles Inlaid with Soft Rubber, Precious Metals, Etc. (*Bull. Rubber Growers' Assocn.*); W—Molded Rubber Toy Elephant (*Process Molds, Inc.*); X—Crepe Soled Sport and Dancing Shoe (*U. S. Rubber*); Y—Welding Hose Bonded together as a Single Unit (*Thermoid*)

increasing amounts of rubber to provide longer vehicle life as well as faster, safer, and more comfortable travel. Constant improvement in the design and construction of the pneumatic tire has not only led to greater mileage and comfort for passenger car service, but has made possible the application of pneumatics to airplanes, high-speed buses, trucks, tractors, and a wide variety of industrial and farm equipment. Aircraft tires alone are now made in as many as 142 sizes and types. The usage of airplanes and automotive units has increased many fold during the past twenty years, probably owing in a large measure to tire development.

Over twenty times as many motor trucks are now in use as in 1916, the year in which pneumatics began to replace solid tires on this type of vehicle. Total sales of truck tires in 1936 amounted to approximately 3,943,000 units, as contrasted with about 337,000 units in 1916. Recent developments in cotton cord and the institution of rayon cord have made possible greater durability at the sustained high speeds and heavy loads to which truck and bus tires are subjected in present-day service.

In practically all types of transportation media rubber receives today great consideration and respect from the designing and specification engineers, and there is an eagerness to know more about its capabilities as an engineering material, particularly regarding its shock absorbing and insulating characteristics. The present wide adoption of rubber as a structural material exemplifies the results of only a comparatively cursory research program, and it is reasonable to presume that its use will be greatly extended as a result of the vast interest which it now commands. The transferal of vibrations and sound originating in the power plant, transmission mechanism, or from exterior shocks is effectively reduced by the proper use of rubber in the form of rubber-to-metal molded parts such as are designed for motor, body, and accessory mountings, spring bumpers, etc. Rubber seals are used in numerous places to exclude moisture, dirt, and wind as well as to aid in the elimination of vibration effects. Rubber is utilized in the manufacture of floor mats, running board covers, and upholstery fabric. Steering wheels, battery cases, and miscellaneous fittings are made of hard rubber. Sponge or cellular rubber is being used in increasing quantities for cushions, arm rests, carpet underlays, and weather stripping at the doors and windows. Insulation material is often applied to the body interior with rubber cement.

In addition to these uses which are more or less generally accepted, the individual modes of transportation present numerous instances where rubber is used in a manner peculiar to each type of vehicle. Airplanes are now fitted with de-icing equipment, shock cords, protective gaskets for metal pipes and wires, and an abrasion shoe mounted on the lead edge of stabilizers as a protection against flying stones thrown by the whirling propeller. In the present-day airplane the rubber in the tires constitutes only one third of the total rubber used in the unit. The rapid adaptation of rubber to automotive engineering has resulted in its use in more than 270 structural parts with a gross weight of more than 50 pounds, excluding tires, for the popular automobile sizes. A new twin bus of exceptional length has been built in two connected sections joined together by a rubber hood and a collapsible rubber seam at the floor line. Caterpillar tractors, capable of a speed of fifty miles per hour, are now equipped with rubber tracks. Steam and electric trains employ large amounts of rubber including flooring, generator belts, diaphragms for interconnecting passageways, and in some instances cushioning segments in wheel and spring construction. Rubber draft gears absorb shock when starting or stopping the train, and truck bolsters are provided with rubber blocks. Pedestal liners of the train trucks consist of rubber vulcanized between steel plates. Newly designed subway and street cars, now in active use in the larger cities, utilize rubber products weighing approximately 400 pounds per car, a large part of which is incorporated in the springs and wheels. In many steamships rubber bearings, in sizes up to 14 inches in diameter and with water lubrication for the propeller shaft, have been found to be more effective than metal. These water-lubricated rubber bearings are installed today in approximately 85% of all small sized motor boats built in this country.

An amphibian boat designed to travel on both land and water is propelled by means of rubber tired wheels running on caterpillar tracks to which are attached flexible rubber paddles which act as propellers when in the water and as a cushioning medium when on land. The marsh buggy is another vehicle of this type; in this case four pneumatic tires, ten feet high and three feet wide, afford sufficient displacement to float the buggy in less than two feet of water. To add traction on land or in the water the smooth tread tires are equipped with pieces of rubber hose to simulate chains. (*To be continued*)

Permanent Ink for Glass, Etc.

A NEW ink, known under the trade name of "S. R. L." Brand LN Glass Ink, is now available for writing on objects of a ceramic nature such as glass, porcelain, or china. In using the ink it is merely necessary to apply it with any steel writing pen, drawing pen, or fine brush. The permanency is increased by gently warming the object. Unlike diamond ink, on the market for years for etching glass, the new ink is non-corrosive and is kept in glass bottles rather than in the usual wax containers.

Laboratory tests have proved that this ink will resist the action of such severe corrosive agents as hot sulphuric acid, hot nitric acid, hot hydrochloric acid, strong alkalies and solvents. Furthermore the ink is not affected in any way by the action of such strong solvents as alcohol, acetone, turpentine, toluene, ethylene dichloride, or carbon tetrachloride. The liquid ink is both non-inflammable and non-corrosive. It is supplied in two colors—black and white.

"Who Drives Your Billboards?"

"EVERY truck or other vehicle on any street or highway which carries a firm name," states a notice to Ontario plant executives from the Industrial Accident Prevention Associations, "is in effect a traveling billboard and the men who drive your billboards advertise your organization favorably or unfavorably."

R. B. Morley, I.A.P.A. general manager, believes that an important new problem for industrial executives is: "Who drives your billboards? Do you know whether your drivers are good drivers or not? Do they observe the rules of the road? Are they careful not to cut in?"

Some firms, he points out, have found it good business to instruct truck drivers to assist motorists in trouble on the highway. Others have trained their drivers in first aid, and those trucks carry small first-aid kits. Often delivery boys on motorcycles and bicycles carry the firm name, and their employers have instructed them similarly in courtesy on the highways.

Distributers' Tire Stocks

In the United States, October 1, 1938[1]

THE results of the quarterly survey of retail stocks of automobile tires and inner tubes, as of October 1, 1938, are shown below in comparison with summary data for preceding surveys, the bases and methods described in previous reports having been used in calculating the stocks held by the following three groups of distributers: 1. Dealers holding over 100 casings each on April 1, 1937. 2. Distributers through oil company chains and some independent filling stations. 3. Manufacturer-owned, mail-order house, and other important retail chains.

Distributers' Stocks Indicated by Surveys

The following summary table covering estimated total stocks held by each group of distributers in surveys made since 1936, shows total stocks of casings on October 1, 1938, half a million lower than a year earlier, and also lower than at other survey dates since April 1, 1936. Stocks held by dealers are lower than in any preceding survey; oil company distributers' stocks are somewhat higher than in October, 1937; other mass distributers' stocks (July 1, 1938, slightly revised) in the aggregate are below average, especially considering the increased number of stores covered by this group.

	Thousands of Casings			
1936	Dealers	Oil Companies	Other	Total
April 1	2,321	1,543	1,890	5,754
October 1	2,179	1,757	2,110	6,046
1937				
April 1	2,465	1,853	2,304	6,622
July 1	2,161	1,996	2,299	6,456
October 1	1,929	1,774	2,289	5,992
1938				
January 1	1,938	2,115	1,920	5,973
April 1	1,932	1,869	2,051	5,852
July 1	1,778	2,079	2,163	6,020
October 1	1,663	1,840	1,990	5,493

Total stocks of inner tubes shown below are at a new record low level, each group of distributers reporting lower stocks than on October 1, 1937. Oil companies reported 119 inner tubes for every 100 casings in October, 1936, 110 in October, 1937, and only 97 in October, 1938.

	Thousands of Inner Tubes			
1936	Dealers	Oil Companies	Other	Total
April 1	3,000	2,040	1,902	6,942
October 1	2,710	2,097	2,228	7,035
1937				
April 1	3,155	2,019	2,170	7,344
July 1	2,602	1,960	2,129	6,691
October 1	2,268	1,957	2,038	6,263
1938				
January 1	2,280	2,127	1,717	6,124
April 1	2,585	1,918	1,728	6,231
July 1	2,289	1,805	1,786	5,880
October 1	2,014	1,781	1,727	5,522

These surveys do not cover stocks of casings and inner tubes held by small dealers; the number of casings held by such dealers is estimated by trade statisticians to range between one million and one-and-a-quarter million, at different seasons. Indications based on returns from dealers shown below would be that small dealers' stocks were further reduced during the third quarter of 1938.

[1] Special Circular No. 3,691, Rubber Section, Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Dealers' Reported Stocks

The following table compares the stocks reported by 1,326 dealers for 1,769 stores in the current survey, with the stocks reported by the identical firms July 1, 1938. The reports are assembled in three groups, each showing reduction of stocks during the quarter, with the greatest percentage decline in the stocks of the small dealers. The index numbers shown below reflect this decline, which is carried into the summary estimates above. About 3% higher October, 1938, index numbers and total dealers' stocks were indicated by comparison of reports received in October of both 1937 and 1938, but the number of comparable reports was less than for the July-October, 1938, dates. In this report returns secured through cooperation of the National Association of Independent Tire Dealers are merged with those of other dealers formerly on the mailing list.

Considering the size of the mailing list and the average stocks per dealer reporting, there is reason to believe that summary estimates of dealers' stocks shown above are somewnat under-estimated on all dates, and that fluctuations in volume of total dealers' stocks have been somewhat greater than is indicated.

Number of Casings	Number of		July 1, 1938		October 1, 1938	
October 1, 1938	Dealers	Stores	Casings	Tubes	Casings	Tubes
Under 200	885	981	97,206	130,221	82,475	118,523
200 - 500	300	457	95,995	131,388	93,262	124,368
Over 500	141	331	161,363	177,911	155,874	165,679
Total	1,326	1,769	354,564	439,520	331,611	408,570
Other October, 1938.	717	1,384			247,933	293,027
Total October, 1938.	2,043	3,153			579,544	701,597
Index Numbers			79.0	101.6	73.9	89.5

Oil Company Distributers' Reported Stocks

Reports were received from 53 firms distributing tires through chains of filling stations, some reports covering stocks held in central warehouses only, while others covered stocks held in retail outlets. A comparison of stocks reported by 46 identical firms in the July and October surveys, reporting 1,257,991 casings July 1, against 1,112,670 on October 1, indicates the decline from July 1 to October 1 in oil company stocks of casings, which with a smaller decline in inner tubes, has been recorded in the index numbers below and reflected in the summary estimates of the first table above. It is believed that the stocks reported below cover fully 45,000 retail outlets.

ACTUALLY REPORTED STOCKS

	July 1	October 1
Number of firms	43	53
Casings	1,215,849	1,133,607
Inner tubes	1,059,213	1,096,430
Index Numbers:		
Casings	126.0	111.5
Tubes	109.4	108.0

(*Continued on page* 46)

The Mechanical Characteristics of Rubber[1]

Behavior As an Engineering Material in Tension, Compression, Shear, and Torsion

F. L. Haushalter[2]

TO TREAT a subject as large as this is a tremendous task, and the author, therefore, plans only to go into phases which may add something to what has already been published and into others which may seem to need further clarification.

When considering rubber as an engineering material, we should bear in mind that it is a vegetable product which, on being coagulated from the sap of a tree, becomes a closely packed mass of rubber globules or hydrocarbons separated by their adsorption film of protein, coming together with some precipitated protein and other serum substances, trapped between the particles during coagulation and drying. We should also remember that the carbon atoms of the rubber molecule lay in zigzag linkages of various lengths which straighten out when stretched, perhaps with free rotation at the points of the single bonds, for the molecule of the rubber hydrocarbon has the formula $(C_5H_8)_x$, x varying perhaps from 500 ot 3000, with one double bond for every C_5H_8 group. The resistance to slippage of the molecule depends on the orientation of the linkages and on the value of the molecular cohesion, as measured by the Van der Waals forces.

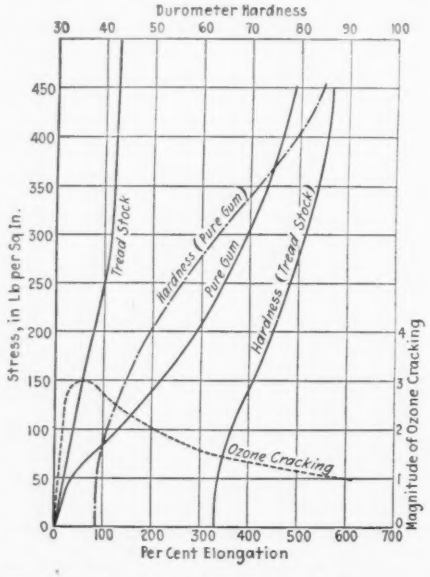


Fig. 1. Stress-Strain Relations and Change in Durometer Hardness with Stretching of Two Rubbers, One a Vulcanized Pure Gum with a Durometer of 40 and the Other a Carbon-Black Reenforced Stock of Durometer 65

Sulphur mixed with rubber mechanically combines with it chemically as a solution, at the application of heat, and even at room temperatures. The change, known as vulcanization, is not a simple chemical phenomenon, for the rate of combination increases with concentration of sulphur, and for initial concentration of sulphur the rate of combination remains constant until most of the sulphur is consumed. The rate of combination is also influenced greatly by the presence of accelerating substances, acting as catalysts.

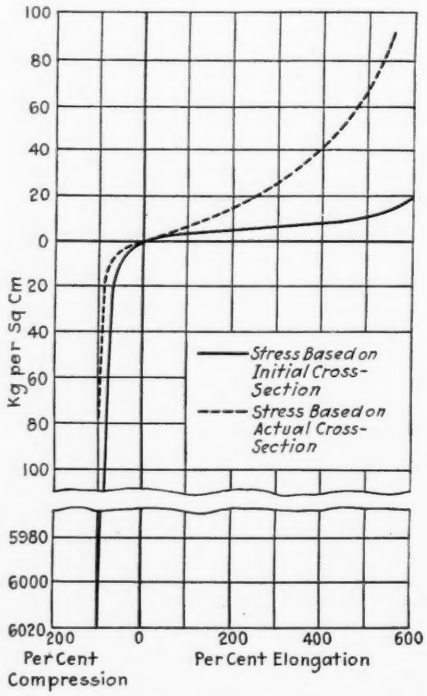

Kg per Sq Cm
Stress Based on Initial Cross-Section
Stress Based on Actual Cross-Section
Per Cent Compression
Per Cent Elongation

Fig. 2. Continuous Tension-Compression Curve for Pure-Gum Rubber

Vulcanization greatly reduces the slippage or creep in the molecular structure of the rubber. Evidence indicates that bridges of sulphur tenaciously join together the molecular structure with an attending stiffening action. Vulcanization is undoubtedly an establishment of cross bonds, perhaps crystalline in character, between long chain fiber molecules, both chemical and mechanical in nature.

General Effect of Stresses

When rubber, either raw or vulcanized, is stretched it becomes warm, and when stretched even small amounts, the heat generated increases sharply above 70% extension. The mechanical work done on the rubber, when it is stretched, is only a small percentage of the total latent heat. Hence the heat generated is something more than

[1]Presented at the Symposium on Rubber of the Rubber and Plastics Committee of the Process Industries Division at the fall meeting of The American Society of Mechanical Engineers, Providence, R. I., Oct. 5-7, 1938. Paper to be printed in an early 1939 issue of *Trans. A. S. M. E.*

[2]Development engineer, B. F. Goodrich Co., Akron, O.

friction; it may be potential energy, stored by strain of an assembly of oriented single molecules, and when the rubber is stretched, there is an evolution of thermal energy corresponding to a heat of crystallization. Likewise rubber stretched to a given percentage, on being heated, contracts.

There is a tight packing of the rubber molecules as rubber is stretched because there is a slight increase in density and a very appreciable increase in apparent hardness. The change of durometer hardness with stretch for two rubbers, one a vulcanized pure gum of durometer 40 and the other a carbon-black-reenforced stock of durometer 65, is shown in Figure 1. This closing up of the structure greatly reduces the susceptibility of the rubber to attack from oxygen, its deadly enemy. The greatest vulnerability of rubber to oxygen or ozone is just at the point of change of hardness; the effect then rapidly diminishes as the hardness increases. It has also been found that the susceptibility of vulcanized pure gum to tearing is greatest at from 50 to 150% elongation.

Figure 1 also shows typical stress-strain curves for the rubbers mentioned in the preceding paragraph when tested in one-directional tension. Rubber tested in tension in one direction is in compression in the other two planes. A very valued piece of work by Sheppard and Clapson[3] showed a direct relation between compressive force and equivalent two-way tensile forces. Hollow spheres of rubber were inflated with gas pressure, and elongation measurements taken in two directions at right angles to each other. The compressive force was computed from the gas pressure, and the degree of compression in the rubber computed from the reduction in wall thickness of the rubber. A continuous tension-compression curve was obtained in this manner for rubber up to a compression of 97.4%. Figure 2 shows the results of the work of Sheppard and Clapson plotted with tension and compression to the same scale. For a stock of the cold-cured pure-gum variety of toy balloon, which had a tensile strength of only 570 pounds per square inch at 700% elongation at break, the compressive load at 97.4% compression went to 13,000 pounds per square inch of original cross-sectional area. There is a point of inflexion in the tension curve, but none in the compression curve.

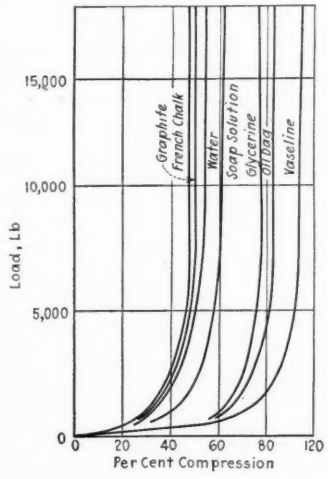


Fig. 3. Influence of Various Lubricants on the Load-Deflection Characteristics of Like Rubber Disks

Rubber in Tension

Rubber is used but little in tension by engineers, although there is no good reason for not using it more extensively now that rubber can be bonded securely to metal. Rubber can be used safely in tensions up to 30 to 40 pounds per square inch and when working in this region of elongation, the load-deflection curves for stocks with a high rubber content is very close to a straight line, meaning that the modulus of elasticity is very nearly a constant within this range. For a pure-gum vulcanizate of about 40 durometer, the modulus of elasticity is about 180.

Rubber in Compression

Rubber has been used longest by engineers in compression, as buffers, shock absorbers and bumpers of various types. A great amount of data has been collected on compression rubber, some of the most noteworthy being by Birkitt and Drakeley[4] and J. Morrison.[5] Their work gives us a basis for design of compression rubber parts.

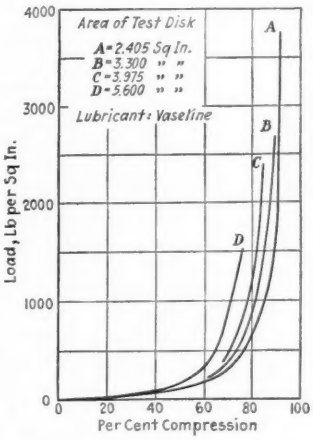


Fig. 4. Load-Deflection Characteristics of Rubber Disks of Various Areas, but the Same Thickness and Composition, Using Vaseline as Lubricant

With Lubrication

Birkitt and Drakeley investigated the influence of various lubricants on the load-deflection characteristics of compression rubber disks of the same dimensions and recipe. The result of this work is shown in Figure 3. What the author wishes to emphasize is that up to 20% compression the curves, obtained by using on the loading plates lubricants of soap, glycerine, oildag, and vaseline, practically coincide. It is the author's experience that compression rubber as a load-carrying member should be limited to 20% compression under normal loading. The author wishes to amplify this fact later, but the chief reason is to keep the creep or drift in the rubber to a reasonable figure. Too often compression pads have been used under loads which very badly distorted the rubber, and the rubber took on excessive creep in a short time.

Birkitt and Drakeley showed that vaseline is perhaps the best lubricant to use in investigating the laws of compression rubber. Vaseline was placed on the rubber and loading plates just prior to making the tests so that swelling and softening of the rubber would not influence the results. Using disks of various areas, from 2.4 square inches up to 5.6 square inches of the same thickness and compound, the rubber being a pure-gum stock of about 40 durometer, they obtained the results shown in Figure 4. Note that even up to 30% compression all the curves closely coincide. The thickness of all disks was only 0.12-inch. If we figure the modulus of elasticity E from this curve as closely as possible, we obtain 188, which is very nearly three times the shear modulus for a stock of 40-durometer hardness.

Birkitt and Drakeley also used vaseline in testing disks of the same recipe as used in the previous test, the thickness varying from 0.157-inch to 0.880-inch. The area of the test piece was 2.405 square inches. Figure 5 shows these results graphically, and Table 1 gives the actual figures obtained. The values at 41.7 pounds per square inch load for all disks lie very close to the curve drawn. If we take the average value of percentage compression

[3] "Compression Stress Strain of Rubber." J. R. Sheppard and W. J. Clapson, *Ind. Eng. Chem.*, July, 1932, p. 782.
[4] "Further Studies in Rubber under Compression." C. H. Birkitt and T. J. Drakeley, *Trans. Inst. Rubber Ind.*, Apr., 1928, pp. 462-67.
[5] "Absorption of Shocks and Vibration by Rubber." J. Morrison, *Trans. Inst. Rubber Ind.*, Aug., 1931, pp. 112-28.

TABLE 1. EFFECT OF VASELINE ON COMPRESSION DISKS OF VARIOUS THICKNESSES

Thickness of Disk, In.	Compression, %, at Loads in Lb. per Sq. In. of:			
	41.7	417	1668	2930
0.157	23.2	55.4	72.6	80.2
0.360	19.7	56.2	70.0	74.5
0.466	21.4	62.2	75.2	80.6
0.607	21.5	61.1	74.2	77.5
0.752	20.3	61.1	74.6	78.5
0.880	20.6	62.6	76.4	80.0
Avg.	21.1	59.8	73.8	78.6

TABLE 2. DIMENSIONS OF DISKS USED BY MORRISON

Curve*	Disk Dimensions: Outside Diam., In.	Inside Diam., In.	Thickness, In.	Width, In.	Ratio of Thickness to Width
A	6⅛	3¾	1	1.28	0.780
B	5¼	2½	1	1.38	0.725
C	6	2	2	2.00	1.000
D	5	1	3	2.00	1.500
E	4⅜	1	5⅞	1.49	3.940

*See Figure 6.

at 41.7 pounds per square inch, we get a modulus of elasticity of 198, which is only 5.3% greater than obtained on the disks of the same thickness but with different areas.

Therefore, it appears from the foregoing that the modulus of elasticity in compression is three times the shear modulus where lubricated surfaces are used and the loading plates are smooth. Morrison[5] later confirmed the work of Birkitt and Drakeley with the disks shown in Table 2. Figure 6 shows the results of the tests without the use of a lubricant, the plates being serrated by grooves 1/16-inch deep. The rubber was of the same recipe in each case and had a durometer hardness of 55. Figure 7 shows the results on the same-size samples tested between smooth plates lubricated with vaseline. The vaseline drew the curves closely together, and, with the exception of curve *A*, the curves almost coincide up to 20% compression, Taking a mean value for the compression of curves *B*, *C*, *D*, and *E*, we obtain a value for *E* of 340, which is equivalent to a durometer hardness of about 57 according to our latest data on modulus of elasticity. Morrison's durometer may have read two points lower than that of the author.

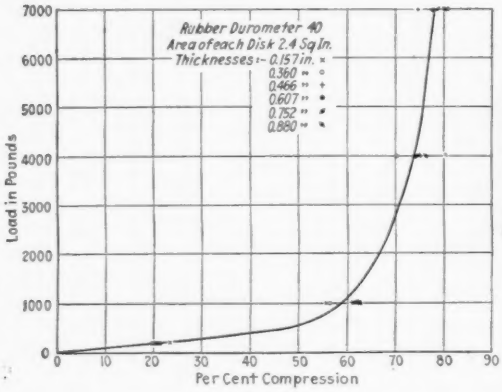


Fig. 5. Effect of Vaseline in Compression Loading of Rubber Disks, Using Smooth Plates

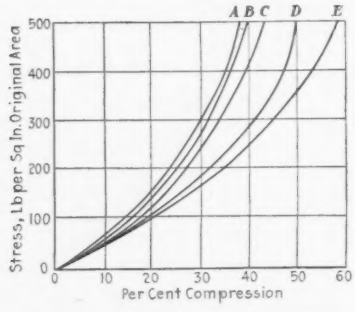


Fig. 6. Load-Deflection Characteristics of Morrison's Rubber Disks, Using No Lubricant and Plates Serrated by ¼-Inch Grooves
(See Table 2 for the dimensions of the disks used)

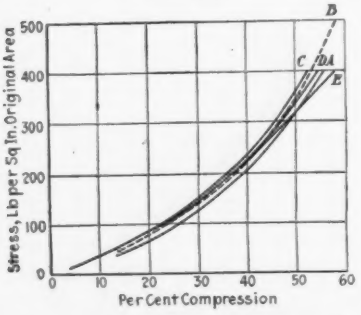


Fig. 7. Load-Deflection Characteristics of Morrison's Rubber Disks, Using Vaseline and Smooth Plates

Morrison took a test piece of this same rubber, five inches long, one inch wide, and ⅛-inch thick and obtained a stress-strain curve in tension. The curve was straight up to 40% elongation, and within this range the modulus of elasticity in tension was 320 as compared to 340 for the compression value. This checks very closely with three times the modulus of elasticity in shear for rubber of 55 durometer.

The author believes that the following conclusion can now be reached: The difference between the load-compression curves, with and without the use of vaseline as a lubricant, can be attributed to the high coefficient of friction between rubber and unlubricated plates.

This conclusion is further supported by tests on sponge-rubber disks. Load-compression tests made on 1, 2, 4, 6, 9, and 14 disks in a stack are shown graphically in Figure 8. The disks were of medium sponge rubber with a cut edge, and were three inches outside diameter, one inch inside diameter, ⅝-inch and ¼-inch thick. Up to 25% compression the points all fall very nearly on the same line. The air cells collapse, and there is very little consequent distortion of the rubber.

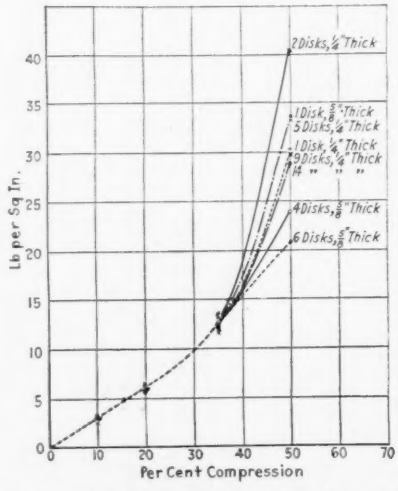


Fig. 8. Load-Deflection Characteristics of Sponge-Rubber Disks Tested Singly and in Stacks

No Lubrication

Assuming that the coefficient of friction is the factor which destroys the ratio of three to one between the modulus of elasticity in compression and that in shear, is there a straight-line relationship of any quantity between these two moduli? The author has found that such a relationship exists if certain proportions of effective width to height are maintained and deflections limited to 15 to 20% of original height. This relationship is based on empirical data. The practical application to be found in such data is that compression rubber, to be used as a load carrying member, should have its deflection limited to 15 to 20% of the original height in order to stay within reasonable values of creep in the structure. All compression rubber slabs, disks, or cylinders, whether bonded to metal end plates or not, which the author has investigated, and where the ratio of thickness to effective width of rubber is equal to one or a little less, the load-compression curve is practically a straight line up to 20% deflection. Under these conditions it has been found that the

TABLE 3. VALUES OF THEORETICAL MODULUS OF ELASTICITY E AND THE MODULUS Ec CALCULATED EMPIRICALLY

	Description of Article	Dur.	Ec	E	Diff., %
1	Disk 6⅛ in. O.D., 3¼ in. I.D., 1.0 in. thick	55	318	324.0	1.8
2	Disk 1¾ in. O.D., ¾ in. I.D., ½ in. thick	46	228	217.0	6.0
3	Disk 3¾ in. O.D., 2.0 in. I.D., ¾ in. thick	50	267	273.0	2.2
4	Disk 3¾ in. O.D., 2.0 in. I.D., ¾ in. thick	58	351	336.0	4.5
5	Disk 3¾ in. O.D., 2.0 in. I.D., ¾ in. thick	69	489	487.5	0.3
6	Disk 3¾ in. O.D., 2.0 in. I.D., ¾ in. thick	70	498	487.5	2.1
7	Hollow cylinder 2⅛ in. O.D., 1⅜ in. I.D., 3¼ in. high	53	297	280.0	6.0
8	Hollow cylinder 2⅛ in. O.D., ½ in. I.D., 5⅛ in. high	55	318	297.0	7.0
9	Hollow cylinder 3⅛ in. O.D., 2¼ in. I.D., 7.0 in. high	57	339	350.0	3.1
10	Hollow cylinder 1.94 in., O.D., 1.0 in. I.D., 40 in. high	51	276	281.0	1.8
11	1 in. cubes	38	163	162.0	0.6
12	1 in. cubes	58	350	343.8	1.8
13	1 in. cubes.	60	449	461.0	3.0
14	1 in. cubes	66	372	360.3	3.4
15	Block 9 in. long, 3 in. wide, 3 in. thick	46	231	231.0	0
16	Cylinder bonded to end plates, 4¾ in. diam. 2½ in. high	33	130	130.0	0
17	Cylinder bonded to end plates, 2¼ in. diam., 5 in. high	40	177	171.0	3.5
18	Cylinder bonded to end plates, 1¾ in. diam. 3⅜ in. high	52	288	270.0	6.6
19	Draft-gear rubber shown in Figure 12	62	395	384.0	3.1

TABLE 4. CALCULATED Ec AND THEORETICAL E VALUES OF MODULI OF ELASTICITY FOR SMITH'S DISKS

Disk Dimensions						
Outside Diam., In.	Inside Diam. In.	Height, In.	Durometer Hardness	Ec	E	T/W
3.50	1.000	1.0	60	372	357	0.80
3.50	1,000	1.0	60	372	357	1.00
3.50	1,000	1.0	60	372	357	1.60
3.00	1.125	4.0	54	307	306	4.26
3.00	1.125	4.0	67	459	453	4.26
3.25	1.000	2.0	60	372	324	1.89
3.25	1.000	2.0	60	372	324	2.59

Note: T/W = ratio of thickness to width.

modulus of elasticity in compression is very close to 6.5 times the modulus of rigidity or shear.

What really happens is that the high frictional engagement between the rubber and loading plate, in not permitting the rubber to slip, causes a considerable proportion of the loading force to be dissipated as a force at right angles to the direction of load application. One has only to view a compression loading test to be convinced of this.

Effective width is defined as the width of the maximum cross-section of rubber. For a one-inch cube this would be one inch. For a rectangle three by one inch, the value would still be one inch. For a perforated slab the distance between holes would be the effective width; for a hollow cylinder it would be the wall thickness of the cylinder, and for a solid cylinder it would be the diameter.

Variable Design

The factor 6.5 holds remarkably well for a vast number of sizes and shapes of rubber articles used as compression members. If we call E the theoretical modulus of elasticity in compression and Ec the modulus in compression calculated empirically by means of the 6.5 factor, Table 3 shows values of each for a number of articles of various dimensions which have ratios of thickness to effective width of one or more. It is interesting to observe that article No. 1 of this table is one of the disks loaded by Morrison between grooved steel plates. Up to 15% compression, the curve was practically a straight line.

Smith has shown elsewhere[6] loading curves for various sizes of disks of various hardnesses. All but one of the disks, which have a ratio of thickness to effective width of one or more, can be calculated for modulus of elasticity in compression with the 6.5 factor with reasonable accuracy, as shown in Table 4. These values hold true for compressions up to 15 and 20% of the original thickness. The other curve in Smith's figure, which has a ratio of thickness to width of more than one does not seem to lend itself to this method of calculation; beside the durometer hardness of 70 there is a question mark.

In loading rubber cylinders one must maintain certain proportions of width to height and cross-sectional area in order not to get into trouble from collapse of the member when used as a column, especially when the member is to be subjected to lateral forces as well as vertical. Figure 9 shows tests on three cylinders and their point of collapse. To determine what these proportions should be might well be worth the effort of an ambitious author who wishes to make a mathematical treatise of rubber cylinders, for rubber cylinders do afford a simple means of isolating machines where compliancy in both vertical and horizontal planes is desired.

Loading curves for one-inch cubes are shown in Figure 10 up to 30% compression. The curves are practical-

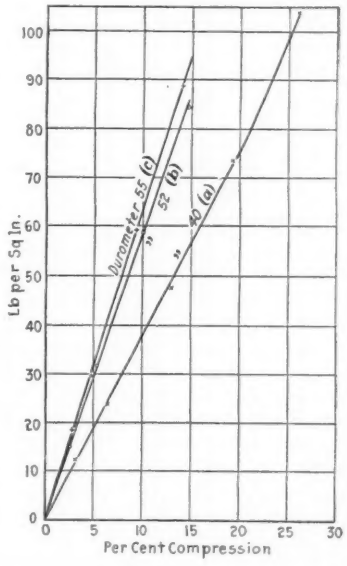


Fig. 11. Compression Loading on the Rubber Cylinders Listed as Articles Nos. 8, 17, and 18 in Table 3

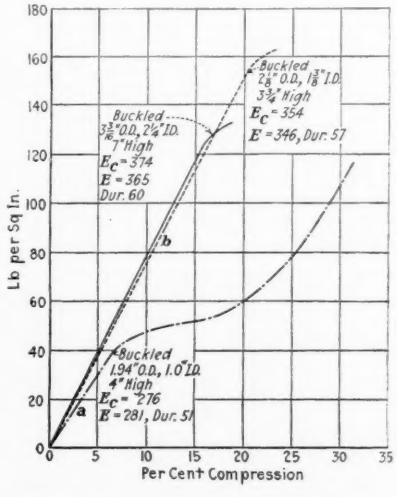

Lb per Sq In.
Per Cent Compression
Buckled 3⅜" O.D., 2¼" I.D. 7" High Ec = 374 E = 365 Dur. 60
Buckled 2⅛" O.D., 1⅜" I.D. 3¼" High Ec = 354 E = 346, Dur. 57
Buckled 1.94" O.D., 1.0" I.D. 4" High Ec = 276 E = 281, Dur. 51
a
b

Fig. 9. Load-Deflection Characteristics of Rubber Cylinders Loaded as Columns

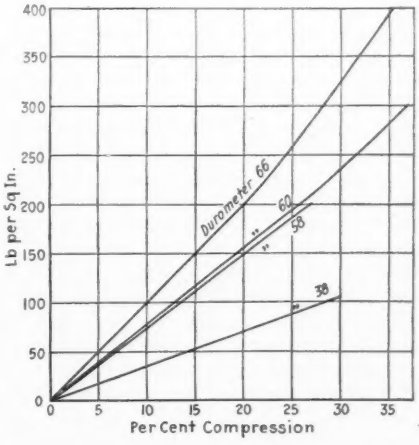


Fig. 10. Compression Loading on One-Inch Rubber Cubes

[6] "Rubber Mountings." J. F. Downie Smith, *J. Applied Mechanics, Trans. A.S.M.E.*, Mar., 1938, p. A-13.

ly straight up to 20% compression.

Loading curves for rubber cylinders, listed as articles Nos. 8, 17, and 18 in Table 3, are shown in Figure 11. These curves are straight lines up to 15% compression.

Figure 12 shows the cross-section of a round ring type of rubber part which has been used in England for a great many years as buffers and as auxiliary springs on railroad cars and locomotives, known as Spencer-Moulton rubber springs. Holes in the steel plate tie in the rubber rings on each side. Adding together the cross-sectional area of the rings we find that the factor 6.5 applied even for this design.

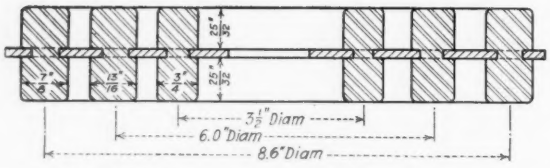


Fig. 12. Spencer-Moulten Circular Rubber Disks for Railroad-Equipment Buffers
(Durometer hardness = 62, Ec = 396, and E = 394)

In Figure 13 is shown the effect of thickness on the compression curves of airplane shock-absorber disks. The curves for thickness of one inch, 1½ inches, and 2½ inches coincide up to about 25% compression, indicating that where a ratio of thickness to effective width of approximately one or more is maintained, the modulus of elasticity can be determined quite accurately. The factor 6.5 also applies for this case, up to the limit of recommended compression loading. Airplane shock-absorber disks for years were used at loadings up to 50% compression of the rubber. High permanent set took place in these disks in the landing gears, and they had to be replaced at frequent intervals. For load-carrying members, 20% should be the limit for normal-load operation, exceeding this only on peak loads, for which dependence rubber is an ideal material.

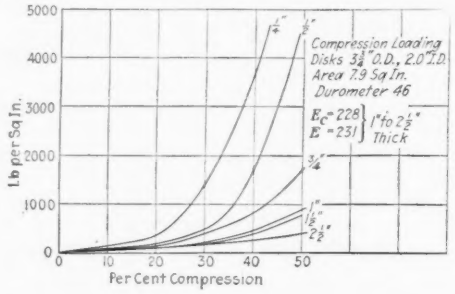


Fig. 13. Effect of Thickness on the Compression Curves of Airplane Shock-Absorber Disks

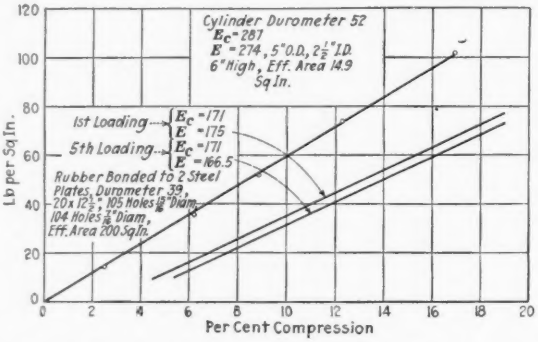

Cylinder Durometer 52
Ec = 287
E = 274, 5" O.D., 2 1/2" I.D.
6" High, Eff. Area 14.9 Sq In.
1st Loading ... Ec = 171, E = 175
5th Loading ... Ec = 171, E = 166.5
Rubber Bonded to 2 Steel Plates, Durometer 39, 20 x 12 1/2", 105 Holes 1/8" Diam., 104 Holes 1/4" Diam., Eff. Area 200 Sq In.
Lb per Sq In.
Per Cent Compression

Fig. 14. Loading Curve for a Neoprene Cylinder and a Rubber Slab

Figure 14 shows a loading curve for a cylinder of Neoprene designed to support a load of 1,100 pounds, also one for a rubber slab designed to support a load of 16,000 pounds. The curves are straight lines in the working range. There seems to be no difference between the modulus of elasticity of Neoprene and that of natural rubber of the same durometer hardness. The rubber slab consisted of two steel plates with rubber bonded between them. A great number of holes through the slab allowed compliancy. One curve is for the first loading, and the lower one for the fifth loading. This is characteristic of all compression loading tests, but in this case the effect is somewhat exaggerated owing to the network construction. Furthermore the straight portion of the curves does not pass through the origin. This is undoubtedly due to lack of uniformity in the thickness of the slab, giving a greater apparent deflection near the origin.

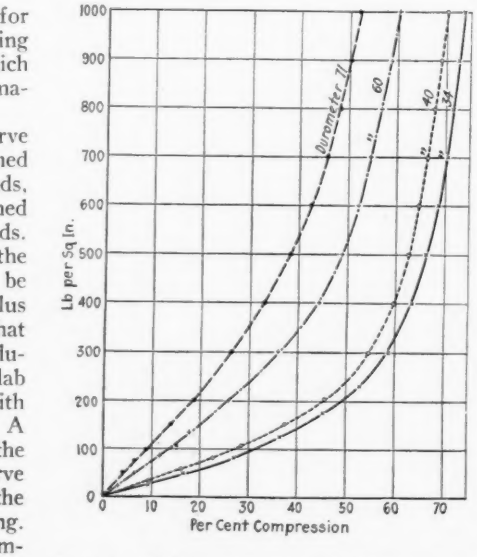


Fig. 15. High Compression Loading on One-Inch Rubber Cubes

In an effort to develop a formula for compression slabs of various sizes, thicknesses, and hardnesses, the author had tests conducted on slabs of the following sizes: one inch by one inch, two inches by two inches, four inches by four inches, six inches by six inches, eight inches by eight inches, and ten inches by ten inches, in thicknesses of ¼-, ½-, ¾-, and one-inch, and hardnesses of 34, 40, 50, 60, and 71 durometer. The author has tabulated these data and to date can find no formula which will satisfactorily apply to them as a whole. Even the loading results on the one-inch cubes of the various hardnesses, as shown in Figure 15 seem to follow no definite formula beyond 20% compression. It is possible that a nomographic chart can be constructed in order to make use of these data within liberal limits of accuracy.

(To be continued)

Rubber Plane Safety Precautions

Howard Hughes in his recent globe-circling flight took every precaution to guard against any emergency, making his ship the most foolproof private plane ever in the air. For forced landing in mid-ocean his monoplane carried two inflatable rubber rafts, with stocks of water and "nose cups" to condense breath into an emergency water supply. Cylinders of carbon dioxide were included to inflate the rafts. The latter, linked with a long tow-line, could float together until aid arrived. For sending an S O S was a waterproof radio transmitter run by dry cells. In case these failed, a waterproof hand generator was provided. The antenna would be held aloft by a hydrogen inflated balloon, and to guide rescue parties smaller orange balloons could be blown up and cast on the waves every quarter hour.

Composition and Colloidal Properties of Balata Latex[1]

A. R. Kemp[2]

BALATA is derived from the latex of trees of the *Mimusops*[3] tribe in the *Sapotaceae* family. The *Mimusops* include a large number of species of evergreens having a wide distribution in the tropics, but concentrated in the Amazon and Orinoco river basins and in the Guianas.

Although balata has been an important commercial raw material for over 50 years, almost nothing has been published concerning the chemical composition and properties of its latex. Owing to the wide interest prevailing in *Hevea* latex it was felt that a study of a kindred latex such as that of balata might reveal information of general interest to rubber technologists. Specifically it should be of considerable interest to colloid chemists to compare the properties of balata latex with those of *Hevea* latex.

Balata latex, unlike rubber latex, does not appear to have been used commercially as such and has therefore not been easily available for study. About six years ago the author obtained about one gallon of each of two balata latices tapped from two types of "bullet trees" used in making Surinam sheet balata. These samples were collected under the direction of the Balata Co., Surinam, and sent to us directly from Paramaribo through the agency of Weise & Co. of Rotterdam, whose assistance we gratefully acknowledge.

Hauser,[4] who examined balata latex microscopically, states that there are two kinds of the so-called "bullet tree." One has a round fruit and yields a bitter reddish latex containing considerable tannin; whereas the other has an oval fruit and gives a mild white milk which is preferred for making good balata.

One of the balata latices received from the Surinam Co. fitted Hauser's description of a white latex except for its faint pink color and will be designated as "white." The other one which had a pronounced reddish color will be designated as "red."

Since several weeks had elapsed between the time the latices were gathered and their delivery, some fermentation had set in, as evidenced by the presence of carbon dioxide, alcohol, and acetic acid. It appears that this fermentation resulted from the presence of natural sugars contained in the latex which were acted upon by the bacteria from the air. Both samples were acid to litmus and had an ethereal odor. A sour cheesy odor was also noticeable in both latices, being stronger in the case of the red. However this odor was not particularly unpleasant compared with the bad odor of *Hevea* latex upon fermentation. The samples contained some small pieces of bark, but were otherwise clean and were practically free from clots. Both had the consistency of thick cream, the red latex being somewhat thicker than the white variety, in spite of having a lower content of solids.

Our study was made on these latices after they had been carefully strained through a fine gauze to remove the pieces of bark and other adventitious impurities which had dropped in during tapping. The strained latices were kept thereafter in glass bottles in an electric refrigerator at about 5° C. except when removed to take samples. Under this condition the white latex has remained in perfect dispersion for over six years, while the red latex gradually coagulated on the surface. After six years the *p*H value of the white latex was 3.6.

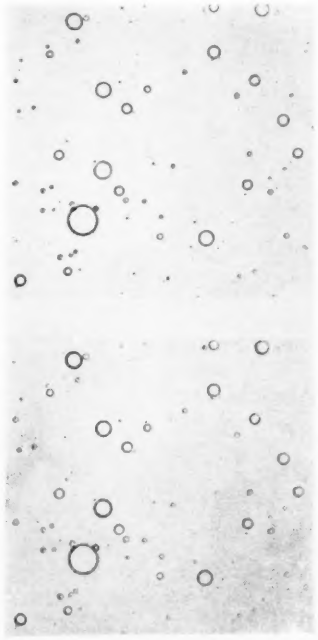


Fig. 1. Balata Latex Particles, × 1800; Showing Two Optical Sections 0.25 Micron Apart, Taken with Ultra-Violet Microscope, Cd. λ 2573 Å

Physical Characteristics

Hauser[4] made a microscopic study of balata latex and found that the latex particles were spherical and varied from 0.5 to 3.5 microns in diameter with particles less than 0.5 micron observable in the ultra-microscope.

F. F. Lucas, of these laboratories, has examined the two balata latices herein described, employing the ultra-violet microscope and technique recently described by him in a study of *Hevea* latex.[5] Lucas has kindly furnished the author with the photomicrograph shown in Figure 1, which confirms Freundlich and Hauser's findings that the particles are perfect spheres. In a preliminary investigation

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[1] Presented at the Rubber Technology Conference, London, England, May 23-25, 1938. Reprinted from the "Proceedings of the Rubber Technology Conference."

[2] Bell Telephone Laboratories, New York, N. Y.

[3] The botanical classification of the *Mimusops* is not complete, as was indicated by a recent summary of the situation by Chevalier, "The Genuine and False Balata Trees," *Rev. botan. appl. agr. trop.*, V. 12, Bull. No. 128, pp. 261-282; 347-358 (Apr., 1932). In the Guianas there appear to be at least two *Mimusops* varieties which are tapped in the preparation of commercial sheet balata. These have been described botanically as the *Mimusops balata* Gaertn. and the *Mimusops Surinamensis*, miq., both coming under the general name *Mimusops globosa* and the common English name of "bullet tree." The block balata from Venezuela also is prepared from the genuine *Mimusops* whereas the inferior Brazilian white block balata of commerce known as "Ecclinusa" balata, Ducke, is prepared from mixed latices of several *Sapotaceae* which have not been botanically well defined.

[4] "Latex," Chemical Catalog Co., New York, 1930.

[5] *Ind. Eng. Chem.*, 30, 146 (1938).

Lucas found the particle size to range in diameter from about 0.1 to 2.5 microns, and the average particle size in both latices was found to be about 0.5 micron. It is possible that some particles may exist which are less than 0.1 micron in diameter since this is about the limit of the equipment employed by Lucas. Under the ultra-microscope there appears to be a multitude of particles which exhibit very lively Brownian motion, whereas the larger particles are in only faint motion, which is true also in the case of *Hevea* latex.

As a result of micro-manipulation studies, Hauser[4] concluded that the balata latex particles have a tough skin and a fluid center. He states that there are many indications that there is an adsorbed layer of resins on the membrane.

The extracted resin of washed and dried balata is a viscous sticky liquid and constitutes 40 to 50% of the material; yet the balata is not sticky at ordinary temperature. This is taken as evidence that the resins are not adsorbed on, but are located within, the latex particles. Further evidence that the particles contain the resin is adduced from measurements of the density of white balata latex. Accurate density measurements cannot be made without considerable dilution of latex owing to the difficulty of removing air bubbles. When diluted to solids contents of 11.3 and 5.88%, accurate density determinations were made at 20°/4° C. using a pycnometer. The values found were 0.9982 and 0.9983 respectively for the above dilutions, showing that the density of balata latex remains practically constant upon dilution. This can be explained by the fact that the volumes of serum and balata particles are practically equal in the original latex. Since the density of serum-free dry balata at 20° C. has been found to be 0.975, the density of the serum must be about 1.025 to compensate. Therefore, as the latex is diluted, the density of the serum decreases, and the increase due to the fewer particles present compensates for this loss.

Particle Composition

The balata particles, besides containing hydrocarbon and resin, appear also to contain considerable water. The water content has been determined in balata, coagulated from the latex with alcohol, and the alcohol quickly removed upon washing with warm water. The washed coagulum was then pressed to a thin sheet to remove interparticle moisture, and the residual moisture was determined by the method recently described by Kemp.[6]

In two separate determinations the moisture contents determined on the dry basis were found to be 18.7 and 18.1%. Although it is not proved that the particles actually contain this water within their outer shell, this would not be surprising since sterols are known to swell strongly in contact with water. The author believes this moisture to be held within the particles since the washed and pressed balata coagulum is practically free from water-absorbing impurities on the outside of the particles and the surfaces of the particles must be in perfect contact without voids. For a more complete discussion of this matter the author's recent article[6] on *Hevea* latex should be consulted.

From the above considerations it appears that sheet balata has a particle structure similar to sheet rubber. The individual particle structures, however, are different since the rubber particles are made up of sol and gel phases; while balata hydrocarbon is more crystalline and does not contain phases of different solubilities in solvents. Furthermore the resin content of the balata particle is about 40% of the whole; while the *Hevea* particle contains only about 1% acetone-soluble matter.[6]

It is of interest to consider the exact location of balata resin in the particle. In this connection it is possible to wash balata for hours under hot water while it is very plastic, following which treatment it has not become sticky, indicating that resin has not been dislodged from the particles as it probably would have been if it were present as a liquid in the center of the particle. It would indeed be remarkable if balata could be mechanically worked under hot water without rupturing the particles. Since the plastic temperature of balata is about 60° C. and that of the hydrocarbon at least 30° C. higher, it would appear that the resin constituents must at least in part be dissolved in the hydrocarbon to lower its softening temperature. The greater hardness of the hydrocarbon as compared with the balata also indicates that the resin is either dissolved in or homogeneously dispersed in the hydrocarbon.

Hevea and balata latices appear to have certain features in common. These latices are suspensoids, the particles of which are composed of hydrocarbon and sterol bodies and vary in diameter from about 0.1 to 2.5 microns with the maximum number of particles in the lower range. The latex particles contain water and have a protective substance or substances adsorbed on their surfaces. In the case of *Hevea* the particles contain a strongly adsorbed protein; while the adsorbed protective layer on balata globules can be removed by washing. The serums contain salts proteins, amino-acids, sugars, and many other substances less well defined which are present to the extent of 10 to 15% based on the total solids. The function of these numerous substances in the plant metabolism is not understood. The chemist therefore has much to learn regarding the mechanism of plant synthesis in the production of these useful latex products.

Chemical Analysis

Table 1 gives the results of chemical analysis of both latices in comparison with the normal range of composition of prime amber sheet balata. These data indicate that prime amber is a product of mixed latex from both types of trees with the white latex predominating. The white latex is superior to the red on account of its distinctly higher hydrocarbon content and gutta/resin ratio, which is in accordance with the statement of Hauser.[4]

TABLE 1. ANALYSES OF BALATA LATEX AND PRIME AMBER SHEETS

	White Latex		Red Latex		
	% Based on				
	Latex	Solids	Latex	Solids	Prime Amber
Total solids	55.4	..	45.9	..	..
Water and volatile matter at 100° C.	44.6	..	54.1	..	2-5
Resin (cold petroleum ether extract)	20.6	37.1	20.0	43.6	37-40
Hydrocarbon (solvent extraction)	29.5	53.3	19.6	42.8	46-52
Ratio gutta/resin	1.43	1.43	0.98	0.98	1.0-1.3
Water-solubles and dirt	5.3	9.6	6.3	13.6	10-15
Ash	0.43	0.77	0.49	1.08	..
Nitrogen (Kjeldahl)	0.27	0.49	0.39	0.85	0.5-0.7
Acidity (c.c. normal NaOH per 100 c.c. of latex)	9.0	..	10.0	..	..

Quality of Balata from Different Latices

Sheets of balata were made from the white and red latex, by drying over calcium chloride in the dark at room temperature, for comparison with first-quality Dutch and British sheet. The latex sheets were light amber in color, turning red on long exposure to air and to a deep red upon exposure to sunlight. This probably explains the presence of light and dark sheets in commercial lots, since in some cases sunlight exposure may be involved in their preparation. The quality of the washed and deresinated balata hydrocarbon from both latices appeared to be about

[6] A. R. Kemp, *Ind. Eng. Chem.*, 30, 154 (1938).

the same. Each had a tensile strength of about 5,000 pounds per square inch with an elongation of about 450% at break, using dumbbell specimens. About the same values were obtained in the case of hydrocarbon from Dutch prime amber and British sheet. This would indicate that considerable care is exercised in preparing the prime balata sheet of commerce and that very little, if any, inferior gums are added as adulterants. Relatively little dirt is found in the best grades of balata as compared with gutta percha of the jungle variety.

Serum Substances

Tschirch and Schereschewski[7] found commercial sheet balata to contain 0.96% ash and 5.7% water extract. By precipitation with tannic acid they separated albuminoids from the serum, and by precipitation with alcohol a gum which gave reactions for carbohydrates. Spence and Kratz[8] separated the insoluble matter from balata and found it to be a complex of protein and carbohydrate.

We were able to extract 9.88 and 10.01% water-soluble matter from samples of two lots of prime amber sheet balata. Sheet balata is the result of drying the entire balata latex as is the case for the solids described in Table 1. In both cases it appears to be possible to extract practically all of the serum substances with water. It can be stated also as a matter of experience that commercially well washed balata is practically free from ash and nitrogenous substances.

When balata latex is diluted with water and coagulated by adding 95% ethyl alcohol up to about 40% concentration, pratically all of the serum substances are found in the alcohol solution. This solution is cloudy because of an incipient precipitation of some of the protein present, which can be filtered off leaving a clear brown colored solution. Upon adding alcohol up to about 80% concentration in this solution a substance giving carbohydrate reactions is precipitated. A small amount of residual nitrogenous substances remains dissolved in the 80% alcohol filtrate. This filtrate upon evaporation deposits a reddish gummy substance high in ash content and present to the extent of about 2% in the original latex. This substance has a bitter astringent taste and gives a strong Benedicts reaction for sugar. The reddish color in balata latex is believed to be due to tannin substances, since the presence of tannin is indicated in the serum of both latices by the ferric chloride test. Tannin, however, is believed to be a contaminant of the latex coming from the bark of the balata tree, which is rich in tannin. The amber to red color of balata sheets is probably the result of the presence of tannin which darkens upon exposure to air and light as a result of oxidation. Balata sheets which are dried out of contact with strong light have a light tan color which slowly turns to amber on standing. Tappers try to avoid contamination with tannins from the bark in producing the desirable light-colored product.

The ash constituents are found in the latex serum. No reference has been found giving the composition of balata ash. Since its composition suggested the presence of certain constituents in the serum, a complete analysis was made of it. About 50 g. of dry white balata latex solids were ashed by the A.S.T.M. method D-297-36. The almost white ash is composed of oxides and carbonates together with some sulphates and chlorides of several elements. A spectrochemical analysis was made to determine the positive elements present. The remaining ash was treated with sulphuric acid to render the silica insoluble and convert the oxides, carbonates, and chlorides to sulphates. A quantitative analysis was made to determine the silica and the major elements present as sulphates. These elements are reported in Table 2 as oxides on the basis that the original ash contained only oxides. This is done in order to compare these results with the only comparable ones available in the literature on the ash of evaporated *Hevea* latex as given by Bruce.[9] Reference to the tabulated analyses shows a wide difference between the composition of balata and *Hevea* ashes, although the total ash contents of balata and *Hevea* latices are about the same. The analyses indicate that balata latex contains relatively little phosphorus in comparison with *Hevea*, which is known to have a high phospholipide content. The absence of phospholipides in balata is indicated also by its practical freedom from fatty acids. The very high base content and especially the high alkaline earth content are notable. In view of this one might expect to find the natural *p*H of the balata latex to be high. Fermentation, which formed acids, prevented us from determining this *p*H, and no value was found in the literature for freshly tapped balata latex.

TABLE 2. ANALYSIS OF ASH FROM BALATA LATEX

	Evaporated Balata Latex %	Evaporated *Hevea* Latex (Bruce) %
CaO	26.92	8.7
Na_2O	24.63	12.4
MgO	21.33	5.8
K_2O	20.78	43.0
SiO_2	4.66	..
P_2O_5	0.98	24.0
Al_2O_3	0.45	..
Fe_2O_3	0.25	..
SO_3	..	2.8
Cl, CO_2, and Fe	..	0.7
	100.00	97.4

NOTE. Other elements found spectrochemically in balata ash are:—Li, Sr, Pb, Sn, Rb, Zn, Ba, Cu, Mn, and Ni. Ramage[10] states that rubidium is found widely distributed in soils and plants.

Balata Resin

Gutta percha and balata resins have been shown by several investigators to consist essentially of mixtures of sterols and sterol esters. The resins found in the gums from the different members of the *Sapotaceae* family vary from liquids to solids, and the amount present in the several species varies widely.

To obtain the balata latex resins in pure form free from serum substances the latices were coagulated with 95% alcohol, and the coagulum washed with 40% alcohol and dried. The resins were then extracted with cold ethyl ether, 42% being removed from the white latex coagulum and 51% from the red. Both resins were water-white viscous liquids, the red latex product being slightly elastic and more viscous than the white. Table 3 gives the results of tests on these resins as compared with those obtained on the yellow liquid resin which is a by-product of deresinating prime amber sheets. Like the commercial resin, both latex resins deposit crystals on standing. These crystals are mixed esters which are practically insoluble in cold alcohol and are composed in part of the acetate of β-amyrin ($C_{30}H_{50}O$); β-amyrin is a terpene alcohol with needle-like crystals, m.p. 197° C., whose chemical constitution has not been fully determined.[11] Both balata and gutta percha resins consist of complex mixtures of terpenes, alcohols, and esters which are very difficult to separate in pure form and whose structures have not been elucidated. These substances are chemically unsaturated and show optical activity. They appear to be closely related to the sterols.

[7] *J. Soc. Chem. Ind.*, 24, 898 (1905).
[8] *Kolloid Z.*, 14, 262 (1914).
[9] *Trop. Agr.*, (*Ceylon*), 59, 267 (1922).
[10] *Nature*, 123, 601 (1929).
[11] Ruzicka, *Ann.*, 1929, 471, 21 (1929).

TABLE 3. ANALYSIS OF BALATA LATEX RESINS

	White Latex	Red Latex	Prime Amber
Acid number	0.0	0.0	0.9
Saponification number*	82.3	82.7	55
Iodine values (Wijs)	158.0	137.7	158
Refractive index at 20° C.	1.5187	1.5257	..
Salkowski and Liebermann tests	Positive	Positive	Positive
Solubility in cold 95% alcohol† %	82.2	36.0	..
Solubility in hot 95% alcohol† %	100	100	..
Separated on cooling alcohol, %	8.4	3.5	..

*W. G. Berry[12] gives the saponification value of balata resin as 69.2.
†2 g. resin and 15 c.c. 95% alcohol after standing 48 hours at room temperature.

The solubility in cold and hot alcohol has for many years been used to separate gutta percha and balata resins into two fractions, the so-called fluavile (soluble portion) and albane or insoluble fraction. Since both the fluavile and albane portions are mixtures of several substances, the solubility depends on the ratio of alcohol to resin taken as well as on other variables in the experiment. This characterization is therefore only a crude one. The alcohol-soluble fraction is larger in balata resin than in gutta percha resins, indicating a lower content of the high-melting sterol esters in balata. It is to be noted from Table 3 that the solubility of the white balata latex resin in cold alcohol is considerably higher than that from the red latex. The iodine value and refractive index of the white latex resins also differ somewhat from the values found in the case of the red latex resin.

No exhaustive research was undertaken to separate and identify positively the different constituents in these resins. By fractional solution methods one finds that these resins consist of a mixture of several substances varying from liquids to solids of widely varying melting points, but all giving tests for sterols. Balata albanes which are present in the crystalline portion insoluble in cold alcohol have been shown by N. H. Cohen[13] and by Tanaka, Kuwata, and Suzuki[14] to contain β-amyrin acetate, m.p. 230-1° C. ($C_{32}H_{52}O_2$), and an ester of lupeol, m.p. 195-6° C. We have noted butyric and caproic acids, in addition to acetic acid, in the saponifiable fraction of the resin. The unsaponifiable fraction which constituted the major part of the resin appears to be a complex mixture of sesquiterpenes and their alcohols.

Little is known regarding the function of these sterol bodies in the plant metabolism. It should be remarked, however, that the close structural relationship of these sesquiterpene compounds to isoprene indicates that they may play an important role in the hydrocarbon synthesis by the plant.

[12] *J. Soc. Chem. Ind.*, 23, 529 (1904).
[13] *Ibid.*, 27, 1123 (1908).
[14] *J. Soc. Chem. Ind. (Japan)*, 38, 504 (1935).
[15] A suitable method for preparing pure balata hydrocarbon is as follows: Dry balata coagulum or sheet balata is dissolved in pure chloroform. This solution is washed with water until it is clear and water-white. Acetone is added slowly to the chloroform solution until the balata hydrocarbon is precipitated. The precipitate is washed with a mixture of acetone and chloroform. The precipitate is redissolved and reprecipitated. Carbon dioxide is used to prevent oxidation and to remove the solvent in the final drying operation conducted at 50° C.
[16] *Chemistry and Technology of Rubber*, Reinhold Publishing Co., New York (1937), p. 716.
[17] *Ibid.*, p. 561.
[18] *Kautschuk*, 8, 137 (1932).
[19] *Trans. Inst. Rubber Ind.*, 5, 71 (1929).

Balata Hydrocarbon

Although balata hydrocarbon is known to be chemically and structurally identical with gutta percha hydrocarbon, it must be recognized that important differences may exist in the mechanical properties of gutta hydrocarbon from different sources. The hydrocarbons from some of the lower grade guttas or balatas are often of lower strength, which may be the result of a lower state of poylmerization, but more likely because they have suffered from oxidation. Much more study of the hydrocarbons obtained from the latices of different species must be carried out to determine differences which may exist.

We have separated the balata hydrocarbon in a high state of purity from both latex and fresh prime amber sheet and have determined some of its constants, which are given in Table 4.[15]

TABLE 4. PROPERTIES OF BALATA HYDROCARBON

Softening temperature (Obach's method)	60-61°C.
Specific gravity at 20° C.	0.961
Dielectric constant (1000 c.p.s., 25° C., mercury electrodes)	2.40
Refractive index N_D^{25}	1.5370
N_D^{20} (extrapolated to 20° C.)	1.550
Heat of combustion (cal. per g.)*	10800

*Calorimetric tests were conducted by the Oscar W. Palmenberg Laboratories, New York City. The procedure was to use an Atwater-Mahler gold-lined calorimeter standardized with benzoic acid. Temperature readings were made on differential Fuess thermometers reading over a range of 5° C. using a lens giving readings to 0.001° C. Heat loss or gain during the operation was determined by Regnault-Pfaundler formula. Corrections were made for heat of combustion of ignition wire and acidity due to sulphur or nitrogen which may be present. Thermometers were standardized by the Physikalisch-technische Reichsanstalt, Charlottenburg, Germany. Quantity of substance was chosen so that the heat rise lay between 3° and 3.5° C., so as to increase accuracy.

Dean[16] gives the density of gutta hydrocarbon as 0.945 to 0.955, but does not mention the temperature at which it was determined. We have determined the specific gravity of pure gutta hydrocarbon from different sources and find it to vary from 0.960 to 0.963 at 20° C. Our dielectric constant value agrees well with that of 2.45 given by McPherson.[17] It should be noted that small amounts of oxidation products and residual resins increase the dielectric constant of gutta hydrocarbon.

Kirchhof[18] gives the refractive index of gutta percha hydrocarbon at 42° C. as 1.5180, which is slightly higher than our value at this temperature. Messenger[19] gives the heat of combustion as 10990 cal./g. for gutta percha hydrocarbon and 11000 cal./g. for balata hydrocarbon. It should be noted that he made corrections for impurities present due to the fact that his hydrocarbons were not pure. His separate determinations showed variations as high as 450 cal./g., which is excessive for this type of determination. We did not apply a correction factor as our material was of a high degree of purity as determined by combustion analysis, iodine value, and its freedom from ash and nitrogen. Our values on two samples of pure balata hydrocarbon were 10799 and 10801 cal./g., which is better agreement than is ordinarily to be expected.

The value of 10800 cal./g. for the heat of combustion of gutta

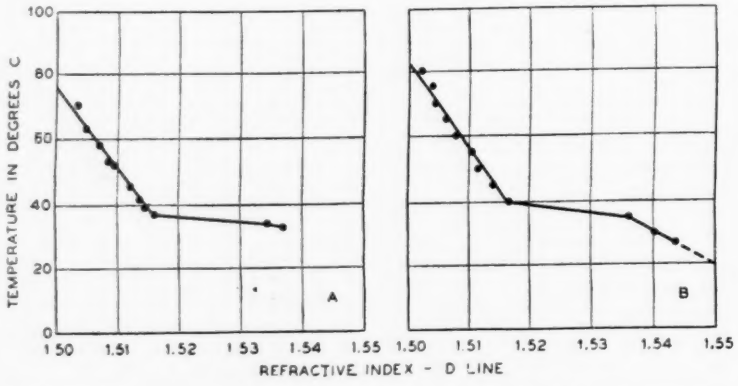


Fig. 2. Effect of Temperature on Refractive Index, "A"—Balata Hydrocarbon and "B"—Gutta Percha Hydrocarbon

or rubber hydrocarbon is probably very close to the true value, since it corresponds closely to the published values for several terpene hydrocarbons which are isomeric with gutta and rubber hydrocarbons. Palmenberg reported values of 10837 and 10800 cal./g. for the heats of combustion of pure sol rubber hydrocarbon which we extracted from resin-free crepe rubber by the cold petroleum ether diffusion method. The value for rubber hydrocarbon reported by Messenger[19] was 10970 cal./g. Kirchhof and Matulka[20] reported a value of 10700 cal./g. for acetone-extracted crepe. This value is low owing to the presence of protein and ash left in the crepe rubber after this treatment. More recently Jessup and Cummings[21] obtained a value of 10802 cal./g. for ether-soluble rubber hydrocarbon.

Pure balata and gutta percha hydrocarbons are milky-white at room temperature owing to inner crystallization. When heated to about 70° C., the crystals melt, and the hydrocarbon becomes crystal clear. Upon cooling at about 1° C. per minute the hydrocarbons start to crystallize at about 37° C., and the mass becomes quite opaque at about 33° C. It would appear from these observations that the β-hydrocarbon which crystallizes out under these conditions has a melting point of 37 to 40° C. Supercooling, however, may have occurred, making this melting point too low.

The refractive index of balata hydrocarbon was measured at different temperatures during slow cooling between 70° C. and 33° C. The refractive index, however, could not be determined with accuracy below 33° C. because of opacity. Pure gutta percha hydrocarbon from Goolie Soondie gutta percha gave almost identical results. The refractive index data for these two hydrocarbons are given in Table 5 and are plotted in Figure 2. In the case of the gutta percha hydrocarbon it was possible to determine the refractive index value at 27° C. The extrapolation to 20° C. is therefore shorter than for balata hydrocarbon, giving 1.550 as the proximate value for the refractive index of gutta percha and balata hydrocarbons at 20° C.

TABLE 5. EFFECT OF DECREASING TEMPERATURE ON REFRACTIVE INDEX OF GUTTA PERCHA AND BALATA HYDROCARBONS*

Balata Hydrocarbon		Gutta Percha Hydrocarbon from Goolie Soondie	
Temp. ° C.	Refractive Index	Temp. ° C.	Refractive Index
70	1.5053 clear	80	1.5020
63	1.5050 clear	75	1.5038
58	1.5070 clear	70	1.5045
53	1.5086 clear	65	1.5060
52	1.5095 clear	60	1.5080
45.5	1.5121 clear	55	1.5105
41.5	1.5135 clear	50	1.5118
39	1.5146 clear	45	1.5138
37	1.5163 clear	40	1.5167
34	1.5345 slightly opaque	35	1.5360
33	1.5370 very opaque	30	1.5402
		27	1.5430

*Thin strip of gutta pressed between heated prisms of an Abbé refractometer and slowly cooled.

It appears that the refractive index of amorphous gutta hydrocarbon between 70° and 37° C. changes with temperature at about the same rate as rubber hydrocarbon between 70° and 20° C. The β-gutta appears to have a different refractive index from the amorphous material. A further study of the refractive properties of gutta hydrocarbon as affected by crystallization should be made. We have noted, for example, that the transformation of the β-gutta occurs at a higher temperature than 37° C. if the temperature is gradually increased from 20° to 70° C. The effect of keeping the temperature constant at various temperature intervals was not studied. It should be possible by more work along these lines to obtain additional information regarding the crystalline modifications of gutta hydrocarbon which have already been studied to some extent by X-ray and electron diffraction methods.

[19] *Ber.*, 57, 1266 (1924).
[20] *J. Res. Nat. Bur. Stand.*, 13, 357 (1934).
[21] *India Rubber J.*, 90, 36 (1935).
[22] *Trans. Faraday Soc.*, 32, 1570 (1936).
[23] U. S. Dept. Commerce Trade Promotion Series No. 41 (1927).

Colloid Properties

The unusual stability of balata latex sharply differentiates it from *Hevea* latex. Unlike *Hevea* it is not coagulated by the addition of dilute acids and alkalies or salts. Both latices cream on standing, the addition of electrolytes increases the rate of creaming, but the cream can be easily redispersed by shaking. The addition of acetone or 95% alcohol is the only satisfactory procedure now known for bringing about coagulation. The addition of 50% alcohol does not bring about coagulation. When it is desired to remove serum substances, a satisfactory coagulation procedure is to dilute the latex with two or three times its volume of distilled water and add 95% alcohol slowly with stirring. Coagulation starts after about 10% by volume of alcohol has been added and is complete after about 40% addition. At the final stage the balata separates and almost completely fills the vessel with a spongy coagulum from which the occluded serum can be easily removed by pressing.

W. H. Stevens[22] and Daniel, Freundlich, and Söllner[23] have recently reported on the unusual stability of a *Mimusops* latex from Brazil which they call "Abiarana" gutta percha latex and classify as *Lucuma lastiocarpa*, family *Sapotaceae*. This appears to be the same product as that described by Vander Laan[24] as "Abiurana," which also was collected in Brazil and found to contain as high as 95% gutta percha. The high hydrocarbon and low resin content of "Abiarana" described by Stevens marks this as an unusual latex which has a composition much nearer to the *Palaquium oblongifolium*, Burk. gutta percha than to the *Mimusops* balata species.

Stevens pointed out that the great stability of "Abiarana" latex must be due to some protective substance contained in the latex. Daniel and his co-workers concluded that this protective substance is reversibly adsorbed on the particles and that it has a high molecular weight since it cannot be removed from the latex by dialysis. Addition of an equal volume of "Abiarana" latex to *Hevea* latex was found completely to protect the rubber from coagulation when an excess of acetic acid was added. These authors, however, were unable to determine the chemical nature of this protective substance, but concluded that it was not a protein.

We have found that balata latex also contains a similar protective substance in its serum. Rubber latex, to which is added an equal volume of balata latex does not coagulate with acetic acid. The unusual protective power of this serum constituent is a matter of considerable interest, since no other substance is known which has an equal stabilizing influence on rubber latex.

Summary and Conclusions

This paper reports the composition and colloidal properties of two types of balata latex from Dutch Guiana. The white variety is shown to be superior to the red, owing to its higher content of hydrocarbon.

It is shown that balata latex is very stable owing to the presence of a highly protective water-soluble substance in its serum. It cannot be coagulated by acids or salts, but is readily coagulated by alcohol or acetone.

The balata latex particles are spherical and vary in diameter from about 0.1 to 2.5 microns with an average diameter of about 0.5 micron.

The balata latex particles are shown to enclose the resins, which appear to be present in a dispersed state in the hydrocarbon. The particles are shown to contain about 18% of water, determined as water of retention in pressed coagulum.

The "resins" have been separated from both types of balata latex as water-white viscous liquids which deposit crystals of β-amyrin acetate on standing. The red balata latex resin is shown to be more viscous than the white and to differ from it as regards its iodine value, refractive index, and solubility in cold 95% ethyl alcohol.

The serum constituents have been separated into four main fractions: protein, carbohydrate, gummy substance, and ash. Minor constituents such as tannin and amino-acid have also been noted.

A complete analysis of balata ash has been made and compared with the analysis of ash from *Hevea* latex by Bruce. Balata ash was found to contain higher contents of CaO, Na_2O, and MgO and lower contents of K_2O and P_2O_5 than *Hevea* latex ash.

New data are presented on the density, refractive index, dielectric constant, and heat of combustion of balata hydrocarbon which are believed to be more reliable than similar data previously available in the literature. Data on the effect of temperature on the refractive index of balata and gutta percha hydrocarbons are presented, showing the crystallization of the gutta hydrocarbon on cooling, which starts at about 37° C. resulting in an abrupt increase in refractive index occurring between 37° and 35° C.

Acknowledgment

The author is indebted to F. S. Malm, W. G. Straitiff, and H. J. Peters, of these laboratories, for assistance in connection with this work.

Addendum

After this paper was submitted to the conference a new sample of balata latex was received from Dutch Guiana through the agency of Hermann Weber Co., New York City. This latex, received in a tightly stoppered glass bottle about one month after tapping, was clean and milky white and had about the same viscosity as normal rubber latex. Some fermentation had set in, and the *p*H value on receipt was found to be 4.2. A particle size analysis made by Dr. F. F. Lucas showed the maximum, minimum, and average sizes to be 3.9, 0.13, and 0.80 microns respectively. This new latex analyzed as follows:

Total solids	43.6%
Resin on solids	44.6
Water-soluble matter and dirt in solids	12.0
Balata hydrocarbon in solids by difference	43.4
Ratio gutta/resin	0.97
Nitrogen in solids	0.40
Ash in solids	0.69

The resin resembled that of the white latex previously investigated. The above analysis indicates that this latex differs from the white latex either because of differing location of the tree from which it was tapped or because of seasonal variations. The differences noted are not basic and could be the result of variations in tree type or of climatic and soil differences.

U. S. Workers Still Thrifty

Despite the fact that more persons are being supported by the public treasury than ever before in the history of this country, the general indexes of thrift and such personalized indexes as the membership in workers' mutual benefit associations indicate that the American worker's thrift cannot be sold short, according to the Management Research Division of the National Industrial Conference Board. Records of deposits in all banks in the United States rose 44.1% from 1933 through 1937. Of the 279 mutual benefit societies reporting to the Conference Board only one out of every five found the severe depression problems a strain on its financial structure. In better times the membership of these mutual benefit associations has increased, indicating that American workmen prefer, even when disabled, to be self-supporting by means of their own thrift and contributions to mutual insurance.

Tire Stocks

(*Continued from page* 35)

Other Mass Distributers' Reported Stocks

Reports were received from seven tire manufacturing companies covering stocks held in company operated retail outlets, and from seven (one more than in previous surveys) other mass distributers covering their total stocks on hand as of October 1. Stocks reported here by manufacturers are presumably mostly also included in manufacturers' inventory as reported by The Rubber Manufacturers Association, Inc. The number of stores reported by tire manufacturers for October was 2,199; other firms 1,868 (against 1,856 revised for July). Reported stocks of both casings and inner tubes were reduced somewhat. Both the July 1 (revised) and October 1 reported statistics under this heading cover all the important chain store distributers of tires, and consequently were included in the summary 100% estimates without adjustment.

TOTAL REPORTED STOCKS

	July 1	October 1
Number of firms	14	14
Number of stores	3,989	4,067
Casings	2,162,711	1,989,645
Inner tubes	1,785,778	1,727,140

Stocks of New York Dealers

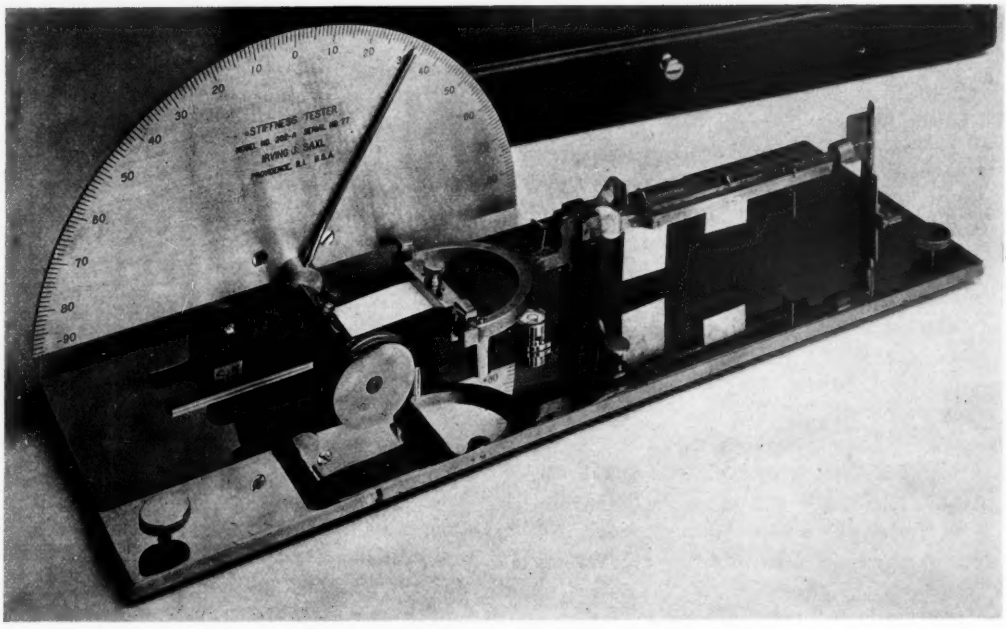
The following tabulation covers stocks reported by dealers in New York State, including reports secured through cooperation of the Greater New York Tire & Battery Association. Comparative data for 110 dealers show particularly sharp reductions of both casings and inner tubes inventories during the third quarter of 1938. This state accounted for 7.36% of the total casings reported by dealers in the current survey and 7.84% of the inner tubes.

Number of Casings	Number of		July, 1938		October, 1938	
October 1, 1938	Dealers	Stores	Casings	Tubes	Casings	Tubes
Under 200	71	84	7,891	11,117	6,493	8,387
200 - 500	24	33	7,909	22,629	7,719	20,799
Over 500	15	15	19,090	13,829	14,004	12,753
Total	110	132	34,890	47,575	28,216	41,939
Other October	43	60			14,431	12,924
Total October	153	192			42,647	54,863

Acknowledgment

The support of The Rubber Manufacturers Association, Inc., the assistance of the National Association of Independent Tire Dealers, and the cooperation and promptness of dealers, oil company distributers, manufacturers and other mass distributers, in submitting data used in this report is gratefully acknowledged.

Evaluation of Stiffness



Saxl Stiffness Tester

THE stiffness of rubber products is of importance in the evaluation and the proper compounding of a great many different types of rubber materials. Rubber soles, transmission belting, tubing, rubber covered wire, and surgical goods are examples of applications in which stiffness tests are of value. Longitudinal characteristics of rubber goods, such as those evaluated by tensile tests, have been known for a long time. The importance of the transversal characteristics is being realized now. Stiffness tests afford a means of achieving uniformity in the finished product. They show the influence of different grades and types of rubber, fillers, and softeners. They help to evaluate the effect of curing time and temperature upon the flexual characteristics of rubber compounds.

The Saxl stiffness tester, illustrated here, is essentially an instrument in which the test piece is clamped horizontally between a rotatable grip and the short end of a weighted balance arm so that the stiffness of the specimen is measured by the degrees of rotation necessary to bring the system into equilibrium. A pointer attached to the axis of the rotating clamp indicates the deflection on a protractor graduated in half-degrees from 0 at the vertical point to 90 degrees at both horizontal ends of the scale. Loads of from 0.02 gram to 101 grams may be placed on the long end of the balance arm.

When the sample has been clamped in place and the proper load applied to the balance arm, the operator turns the radial pointer clockwise from the vertical position until the system is brought into balance as indicated by a longitudinal pointer at the extremity of the right-hand end of the balance arm. The stiffness of the specimen is taken as a function of the number of angular degrees that the pointer has been deflected from the vertical position. The higher the deflection for given load and sample dimensions, the more flexible is the specimen.

In addition to varying the load on the balance arm, the length and the width of the sample may be varied according to its stiffness characteristics. The maximum width obtainable is 15 centimeters. As the rotatable clamp and protractor are mounted on a carriage which can be moved away from the balance arm, samples with lengths of from two to seven centimeters can be accommodated. Thus, for testing extremely stiff materials, a long, narrow sample is employed; while soft materials are tested preferably in the form of wide, short specimens.

The permanent deformation of the sample is obtained by holding the sample under a predetermined deflection for a definite period of time (generally ten minutes), thus reducing the load on the balance arm to zero, and turning the protractor pointer back until the balance pointer is in equilibrium. The number of degrees then registered on the protractor scale is taken as the permanent deformation. The per cent. of elastic recovery is calculated by dividing the mathematical difference between the stiffness and permanent deformation readings by the stiffness.

In the textile industry the tester has been used to study the influence of sizes, softeners, finishing compounds, yarn construction, and processing machinery upon the stiffness of the finished product. The instrument has also found application in the evaluation of the stiffness of wires, thin sheet metal, celluloid, paper, cardboard, thin molded plastics, and other similar materials in the form of thin sheets or rods.

Editorials

Increase of Permissible Rubber

THE real increase in permissible crude rubber shipments for the first quarter of 1939 is not truly indicated by the increase from the 45% now in effect to 50% starting January 1, 1939, which was fixed by the International Rubber Regulation Committee at the meeting on November 15. Data appearing on page 55 of this issue shows the probable effect of this decision on permissible shipments and world stocks in view of certain assumed conditions.

For the present quarter of 1938 the basic quota for territories other than Siam, French Indo-China, and non-agreement countries is 323,814 long tons, which at 45% permits shipments of 145,716 long tons. For the first quarter of 1939 the basic quota is raised to 366,126 long tons, and permissible shipments of 50% on the new base will amount to 183,063 long tons. There will actually be an increase in permissible rubber shipments of 37,347 long tons during the first three months of 1939, which will be equivalent to an increase to 56.5% on the basic quota now in effect.

If we assume that the world absorption will continue through March, 1939, at the monthly rate of 40,000 long tons within the United States and of 40,885 long tons (average for the first nine months of 1939) outside of the United States, the world stock at the end of the third quarter 1938 of 507,711 long tons, or 6.3 months' supply, will have changed to 441,009 long tons, or 5.5 months' position at the end of December, 1938, and to 413,229 long tons, or 5.1 months, on March 31, 1939.

According to this deduction, in which the probable shipments of Siam, French Indo-China, and non-agreement countries also have been taken into consideration, the new basic quota and 50% permissible shipments will not prevent a diminishing world stock. If this conclusion proves correct, or if the consumption increases, as is hoped for, it will be necessary again to increase the basic quota or per cent. permissible for the second quarter of 1939.

In the increase just voted there is an indication that the International Rubber Regulation Committee takes note of the fact that wider usage of rubber and the growth of the industry are dependent upon the price. There is apparent a real desire on its part to hold the price in check and to stabilize the market within a reasonable range. In view of the reported indication that the producing interests desired the continuation of the present 45% allowable and the consumers were favorable to 55%, the apparent compromise indicates a recognition of the consumers' view-point and other influencing factors such as the possibility of wider usage and new synthetics.

Two-Year Economic Research

ANNOUNCEMENT has been made by Dr. Virgil Jordan, president of the National Industrial Conference Board, that the board has undertaken a two-year program of research into the results of private and public management of economic activity in the United States and other countries such as Soviet Russia, Italy, Germany, Australia, Sweden, France, and Great Britain. Unbiased reports of great value should result from this investigation because the Conference Board is a non-political institution supported by individuals, business concerns, labor unions, and educational institutions for the sole purpose of analyzing, and reporting significant facts regarding economic conditions and prospects.

In view of the rapid growth of authoritarian systems of control over labor, production, and consumption in various parts of the world, it is important that American enterprise and the workers, investors, and consumers, who are vitally affected by the system used, should be familiar with the principles, results, and desirability for future consideration. The American people face the probability of having to decide in the not too distant future whether their present system of free enterprise is to be preserved or replaced by State management of their life and work. Usual procedure is for new systems to make continual inroads in such a manner that the general public is not aware of them until a strangle-hold is obtained, and such tendencies can be avoided only by a complete knowledge of the workings and manifestations at the beginning.

As it is the declared intention of the National Industrial Conference Board to publish the results of the sectional research in pamphlet form and those pamphlets in bound volumes, there should be available to the public complete factual information. According to Dr. Jordan's statement that "the enterprise principle in the economic organization in the United States will finally stand or fall upon the actual results of its operation," it is presumed that the board realizes fully the importance of such an investigation and the absolute necessity of a completely thorough survey and a profoundly impartial reporting of the existing facts. If the survey is properly conducted and the complete results publicized, the people will be so informed as to prevent political conjurers from misleading the public through partial or distorted statements as to the results obtained by the various types of economic enterprise under consideration.

EDITOR

What the Rubber Chemists Are Doing

A.C.S. Rubber Division Activities

Detroit Group

APPROXIMATELY 75 members and guests attended the fall meeting of the Detroit Group, Rubber Division, A.C.S., held on October 28 at the University Club, Detroit, Mich. The feature of the meeting was the presentation of the motion picture "Rubber Reborn," shown through the courtesy of the Midwest Rubber Reclaiming Co., East St. Louis, Ill.

Officers for the 1938-39 season were elected as follows: chairman, E. Kvet, Baldwin Rubber Co., Pontiac, Mich.; vice chairman, W. Nelson, United States Rubber Products, Inc., Detroit; secretary-treasurer, J. Allen Bumpus, Collord, Inc., Detroit; Hal Anderson, of the Flintkote Co., Detroit, will be in charge of entertainment.

The group will hold a Christmas meeting at the University Club on December 16 at 7 p.m. The program for this meeting has not yet been completed, but it is planned to have a technical talk as well as entertainment.

Los Angeles Group

ON NOVEMBER 1 the Los Angeles Group, Rubber Division, A.C.S., held its regular monthly meeting at the Mayfair Hotel in Los Angeles, Calif., with 101 members and guests present. L. Horchitz, of The B. F. Goodrich Co., discussed some of the problems he encountered while developing unusual rubber products for the motion picture industry during the past several years. A talk was then given by L. E. Clark, head of color research for the Dunning Film Process Co., who is an authority on sound and color film recording. To complete the program Count Cutelli, expert on the creation of sound effects for movies and radio, produced many different types of sound, using only an inflated, silk-lined rubber ball.

Table favors, donated by E. I. du Pont de Nemours & Co., Inc., through H. J. Jordan, comprised toothbrushes with the new synthetic bristles. A carbonated water siphon, the door prize, was given by Martin, Hoyt & Milne, Inc., through M. Montgomery; while a very beautiful desk set, was contributed by the National Standard Co., through L. O. Smith. At the business session chairman Ed Royal named a nominating committee. The membership committee reported 16 new members; while the golf committee announced a tournament to be held at the Flintridge Country Club this month.

The next group meeting will be held at the Mayfair Hotel on December 6. The program will be under the auspices of the Firestone Tire & Rubber Co., with Clyde E. Smith, Firestone factory manager presiding. J. F. Moore, associated with Firestone in supplying tires for racing cars, will speak on "Racing." Reclaimed rubber will be the subject of another talk at this meeting.

Akron Group

THE fall meeting of the Akron Group, Rubber Division, A.C.S., held at the Akron City Club, Akron, O., on November 11 was attended by 208 members and guests. Group Chairman A. E. Warner presided at the meeting. The speaker for the evening, Dr. William C. Geer, who was introduced by J. W. Schade, chose as his subject "Spirit of Research in the Rubber Industry." Of special interest to the old timers in the industry, particularly those connected with the early history of Goodrich and Diamond, was Dr. Geer's reminiscence of the days preceding what is known today as the "era of research." His informal discussion traced through the days when little was known of the science of rubber and the introduction of the first control methods and organic accelerators. He then disclosed how management, realizing the value of research, began to support it, which action led to the well-organized research within the industry today.

Boston Group

OFFICERS for 1939 will be elected at the fall meeting of the Boston Group, Rubber Division, A.C.S., to be held Friday, December 2, at the Fox & Hounds Club, 448 Beacon St., Boston, Mass. Raymond Kierman, news editor of the *Boston Traveler*, will talk on "Newspaper Life." Mr. Kierman started his career as office boy for the Boston News Bureau and, as he has been a reporter, feature writer, city editor of various newspapers, magazine article writer, and radio commentator, he is well qualified to give an informative and interesting picture of the gathering and printing of news.

For the rubber section of the program the group has obtained Dr. Ernst A. Hauser, associate professor of chemical engineering, Massachusetts Institute of Technology, who will speak on "A World Picture of the Rubber Industry." He will review how changes in the methods of manufacture have affected the rubber industry and will discuss the relation of the rubber industry in the United States to that of the rest of the world. Dr. Hauser has also agreed to describe briefly "Asi-film," a translucent paper-like film made from clay, mentioned on page 59 of the August, 1938, issue of INDIA RUBBER WORLD and described in the November 7 issue of *Time*. The program also includes door prizes and entertainment.

Chicago Group

THE Chicago Group, Rubber Division, A.C.S., held a meeting on November 11 at the Hotel Sherman, Chicago, Ill. Preceding the meeting members and guests dined in the College Inn where they were entertained by Buddy Rogers with his orchestra and the floor show. Adjourning to the Louis XVI Room, the group heard E. R. Bridgwater, division manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., speak on the subject, "The Evaluation of Synthetic Rubber-Like Materials." There was an exceptionally large attendance of over 140 for this first seasonal meeting. The group will hold its Christmas Party and Ladies Night, December 9, at Hotel Sherman.

New York Group

THE annual Christmas party of the New York Group, Rubber Division, A.C.S., will be held on Friday, December 16, at the Building Trades Club, 2 Park Ave., New York, N. Y. Distribution of gifts will be a major feature of the event. Entertainment, which will include several feats of deception by H. Walter Grote, of the United Carbon Co., has been promised by the committee. Owing to the length of time necessary for the distribution of gifts, there will be no technical paper presented at the party. Tickets are $2.50 for members and $3.50 for non-members; reservations may be obtained from Peter P. Pinto, *The Rubber Age*, 250 W. 57th St., New York, N. Y.

Nichols Medal Award

THE New York Section of the American Chemical Society has awarded the William H. Nichols Medal for 1939 to Dr. Joel Henry Hildebrand, professor of chemistry, University of California, for his studies of liquid and solid solutions. Professor Hildebrand will be given the medal at a dinner in New York on March 10.

S.C.I. News

Perkin Medalist

THE Perkin Medal for 1938 goes to Dr. Walter S. Landis, vice president, American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., for his work in the fields of phosphates and cyanamids. The award will be made at a joint meeting of the A.C.S. and the S.C.I. on January 6, 1939, at the Chemists' Club.

Dr. Landis, who was born in Pottstown, Pa., in 1881, holds three degrees from Lehigh University: Met.E., 1902; M.S., 1906; Ph.D., 1922. After graduating he joined the faculty of his Alma Mater, where he remained until 1910, when he went to American Cyanamid. He is the author of many articles and holds about 50 patents, mostly on chemical processes of electrochemistry. He also won the Chemical Industry Medal for 1936. Dr. Landis is past president of the American Electrochemical Society and belongs to the A.C.S., American Institute of Mining & Metallurgical Engineers, and American Institute of Chemical Engineers.

Future Meetings

OTHER meetings, all held jointly with A.C.S., announced by the American Section, S.C.I., follows: December 9, A.C.S. in charge; February 10, S.C.I. in charge, speaker, Wanda K. Farr on "Viscose Rayons;" March 10, A.C.S. in charge; April 7, S.C.I. in charge; May 5, A.C.S. in charge.

New Neoprene Types

NEOPRENE TYPES G and GW, new polymers of chloroprene which are much more elastic than Neoprene Type E, are now available in commercial quantities, according to an announcement by the manufacturer, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Chloroprene is polymerized by a new method to produce a tough, non-plastic polymer which can be plasticized in the presence of cold water or by chemical means. Neoprene Type G is plasticized before shipment by milling in 2% di-ortho-tolylguanidine. Type GW is made of the same crude polymer plasticized by milling in the presence of water and is somewhat more smooth milling and "nerveless" than Type G, but more expensive. Neoprene Type GW is compounded the same as Type G, and its vulcanizates have the same properties. The principal advantage of Neoprene Type GW over Type G is that it will shrink less after calendering or tubing when used in lightly loaded stocks.

Neoprene Type G is claimed to be superior to Type E in many of its properties as indicated by the following: higher modulus and tensile strength; better abrasion resistance; wider range of curing temperatures; lower permanent set and drift; lower hysteresis loss; less heat build-up; better resilience; better adhesion to itself, to rubber, and to metal; better processing and building characteristics (tackiness); less swelling in oil and deterioration by oil; higher cured hardness; less odor; and better tear resistance. Type G is equal to Type E with respect to the following: heat resistance; aging; flex cracking; and resistance to flame, ozone, chemicals, and sunlight.

In compounding Type G it is unsafe merely to substitute it for Type E in production stocks and assume that the finished product will be improved. The basic formula for Neoprene Type G is:

Neoprene Type G	100
Extra Light Calcined Magnesia	4
Zinc Oxide	5

The addition of 2% of Neozone on the Neoprene in the base formula for all stocks that may encounter extreme service conditions or are expected to last for long periods of time is recommended. Neoprene Type G may be plasticized to any degree of softness desired and can be stored in the uncured state for long periods, while retaining its building qualities.

Anhydrex AA-LL

ANHYDREX AA-LL insulation is said to combine for the first time in one 60% rubber insulating compound the following desirable properties: low water absorption, high electrical qualities, long life, and heat resistance. The new oil-base insulation, through the use of deproteinized rubber, retains the low water absorption characteristics of Anhydrex AA-60 and, in addition, has greater heat and age resistance. The development incorporates low-sulphur vulcanization methods.

The low water absorption of Anhydrex AA insulations (0.010 gram of water per square inch of exposed surface after seven days at 70° C.) eliminates the need of a lead sheath which, besides making the cable lighter and easier to handle, eliminates corrosion, electrolysis, and sheath currents that sometimes affect the operation of lead sheathed cables. As a result of low water absorption, the electrical properties (unit capacitance less than 3.0 and power factor less than 1.0%) are stable in water. Tests indicate that the new Anhydrex insulation will retain at least 75% of its original tensile strength after 504 hours at 158° F. in an oxygen bomb at 300 pounds' pressure, and that its heat resisting quality will permit an operating temperature of 167° F. with a corresponding increase in current carrying capacity. Anhydrex AA-LL is said to be suitable for submarine and other services requiring exceptional performance.

Courses in Rubber and Colloid Chemistry

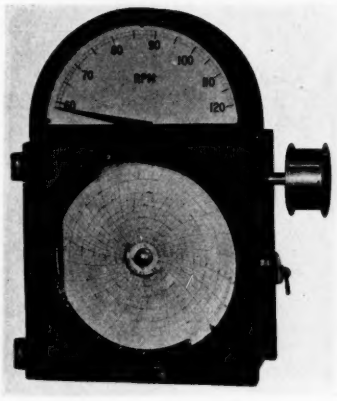
THE Division of University Extension, State Department of Education, of the Commonwealth of Massachusetts on November 8 instituted a new course of 16 lectures, "Rubber—Its Chemistry and Application," which treats of the many uses of rubber in modern industry and indicates opportunities for its further development. It is intended to give a comprehensive picture of the rubber industry to those now engaged in its various activities and to those interested in its development. The class meets Tuesday evenings 7:30 to 9:00 p.m. at Massachusetts Institute of Technology, Cambridge, Mass., Room 390, Building 2. For the complete course of 16 lectures there is a charge of $9.00 or for each part consisting of 8 lectures the cost is $5.00.

The program follows: November 8 and 15, "Chemistry of Rubber," Dr. Ernst A. Hauser, M. I. T.; November 22 and 29 "Compounding Ingredients," M. Omansky, chemist, Arthur D. Little, Inc.; December 6, "Raw Rubber—Reclaiming," J. C. Walton, technical superintendent, Boston Woven Hose & Rubber Co.; December 13, "Calendering, Extruding, Proofing, Spreading," Joseph L. Haas, Hodgman Rubber Co.; December 20, "Heavy Mechanical Rubber," instructor to be announced later; January 3, "Sundries—Electrical Tapes, Crepe Soles," F. E. Harris, Plymouth Rubber Co.; January 10, "Latex," Dr. Royce J. Noble, chemical engineer; January 17, "Rubber Footwear," W. E. Glancy, Hood Rubber Co.; January 24, "Rubber Insulated Wire," A. R. Kemp, organic research chemist, Bell Telephone Laboratories, Inc.; January 31, "Vulcanization," instructor to be announced later; February 7, "Tires," Walter J. Geldard, chief chemist, Fisk Rubber Corp.; February 14, "Rubber Derivatives—Synthetic Rubber," instructor to be announced later; February 21, "Laboratory Tests and Their Limitations," February 28, "Looking Forward in the Rubber Industry," both by Mr. Omansky.

Another new course, "Colloid Seminar," to be inaugurated December 9, is also under the auspices of the Massachusetts State Department of Education, classes being held at M. I. T. In this advanced course, which will cover

(*Continued on page 52*)

New Machines and Appliances



Amthor Tachometer

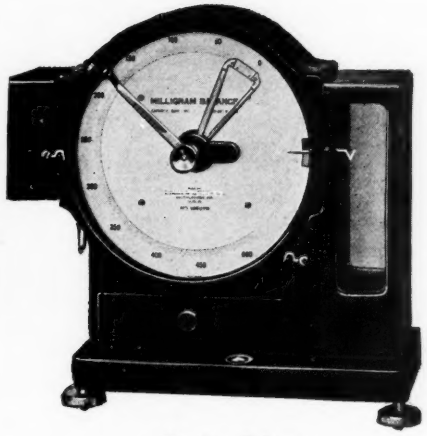
Indicating and Recording Tachometer

A NEWLY developed tachometer of the indicating and recording type makes it possible accurately to trace and check production performance of many kinds of industrial plant machinery. On an eight-inch chart are recorded starting and stopping times, slowdowns, non-productive periods, and the time and duration of each. The indicating dial permits the operator to keep a check on the speed at which the machine is running even though the tachometer may be mounted at some distance from the machine. Black characters on a white dial allow maximum visibility.

The recorded movement is based on the centrifugal principle, and the motion of the governor is transmitted directly to the pen arm and dial pointer by connecting links. Direction of rotation has no effect upon the governor mechanism. The chart is driven by a standard clock movement to give a 12- or 24-hour record, as specified. Wear in the instrument is minimized by the use of precision ball bearings. Amthor Testing Instrument Co., Inc.

Direct-Reading Milligram Balance

A DIRECT-READING torsion balance is suited to the rapid and accurate weighing in milligrams of small quantities. The weighing beam is mounted on a steel shaft to which is attached the inside end of a spiral spring. The outside end of this spring is attached to the index pointer; while the index lever is attached to the same shaft as the index pointer.



Torsion Balance

In operation, the object to be weighed is hung on the hook at the right end of the weighing beam or placed in a pan suspended from it, and the beam is released. As the index lever is rotated to bring the system into equilibrium, it rotates the index pointer and winds up the spiral spring which lifts the beam. When the small pointer fastened to the beam indicates zero, the rotation is stopped, and the weight read directly from the dial. To aid in accuracy of readings the index pointer has a vernier. The angular relation between the index lever and the vernier may be varied by loosening the knurled nut and shifting the lever to the position most convenient for the operator.

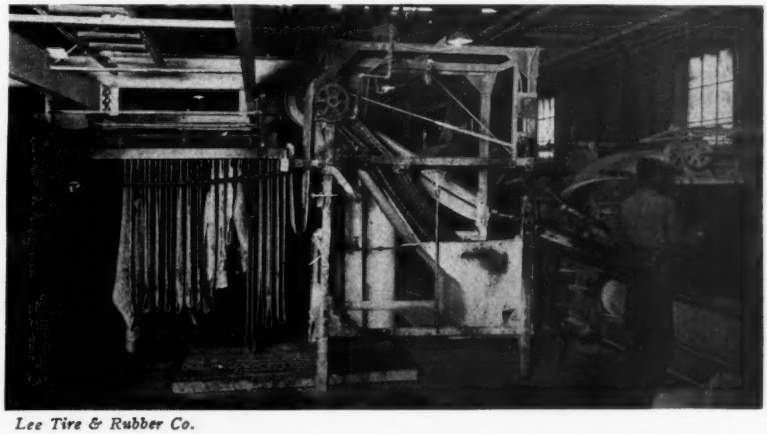
An additional hook on the left end of the weighing beam provides for compensation of weighing pans or extending the range of the balance. The working accuracy of the balance is 1/20 of 1% of full scale. Thus to insure greatest accuracy a balance should be chosen with the upper limit of its range close to the maximum weight to be measured. The balance measures 11¼ inches in width, 10½ inches in height, and four inches in depth. Balances of different scale ranges are available; the minimum range is naught to three milligrams, and maximum, naught to 2,000 milligrams. Will Corp.

Automatic Stock Take-off Machine[1]

AN APPARATUS for facilitating the removal of rubber from a continuously operating mixing mill consists essentially of three separate units: (1) a combined take-off and conveying unit for stripping and delivering the stock from the surface of the front mill roll; (2) an intermediate unit in which a conveyer receives the stock, feeds it through a soapstone emulsion bath, and then conveys it to the festooning unit for cooling or storage; and (3) a movable carriage suspended from an overhead track and designed to arrange and support the stock in a festooned condition.

In operation, the stock is removed from the mill roll in the form of a continuous strip of uniform width; the width is governed by the location of the adjustable stock knife which bears against the surface of the roll. The strip is fed upward by an inclined belt conveyer and then discharged downwardly into the soapstone tank from

[1] Abstracted from U. S. Patent No. 2,102,453, December 14, 1937.



Lee Tire & Rubber Co.

Stock Removal Apparatus Showing Carriage (at Left) Being Loaded with Festooned Stock

which it is delivered upwardly along an inclined path by a conveyer chain assembly. The strip is then discharged to the festooning unit where it is automatically hung on bars in looped sections through the action of cam and sprocket chain mechanisms. After the carriage is loaded, it may be moved along the track to make room for another festooning unit. Each loop is cut at the bottom before removal.

The new apparatus eliminates the laborious work entailed in the manual removal and handling of stock from the mixing mill. With faster removal after proper mixing, greater uniformity per batch and higher mill capacity are obtained. The reduced thickness of stock (for example, to $^{3}/_{32}$-inch or less) and the festooning to permit free circulation of air greatly reduced the cooling time.

Electrostatic Dust Precipitator

A COMPACT and efficient electrostatic precipitator, known as the Precipitron, is said to be applicable to all classes of industrial dust and fume removal problems with the exception of those involving the collection of highly combustible or explosive materials. As shown in the accompanying illustration, a complete unit comprises three essential parts: the collector plate cells, the ironizing assembly, and the power pack (rectifier). The ionizing assembly is of unit construction and utilizes tungsten ionizing wires which are spring supported. The collector plate cells may be constructed of steel, aluminum, brass, or special alloys to resist corrosion or high temperatures. The power pack contains high voltage rectifying tubes for converting A.C. into high voltage D. C.

In operation any particles in the air or gas passing through the ionizing chamber are electrically charged, and upon entering the precipitation chamber the electrostatic field between the plates exerts a force which drives the particles to the grounded plates where they are deposited. At necessary intervals these plates are cleaned by washing, tapping, or blowing with an air jet; the method used depends upon local conditions.

Advantages claimed for the new unit include: small space requirements; elimination of appreciable amounts of ozone or oxides of nitrogen in discharged air; removal of particles as small as $^{1}/_{5}$ micron with an efficiency of 90% (blackness test); uniform air volume; low power consumption and operating cost. Pangborn Corp.

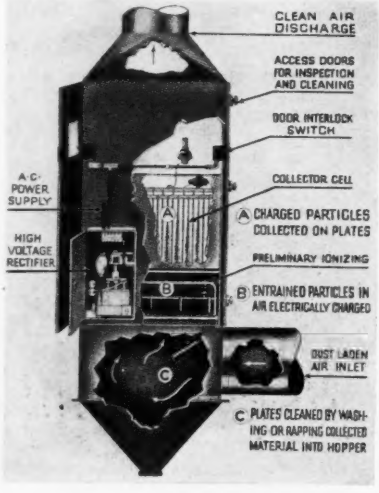
Benzol Indicator

DESIGNED specifically for the investigation of benzol concentrations which might be dangerous to the health of workers, the M.S.A. benzol indicator is nearly 15 times as sensitive as the standard M.S.A. combustible gas indicator. The range of the new instrument is from 0 to 1000 parts of benzol per million parts of air. Fifty graduations on the meter scale make it possible to read directly concentrations to within 20 p.p.m.

Instrument for Indicating Benzol Concentrations

The operation of the detector depends upon the combustion of benzol on the surface of a hot platinum detector filament which forms a part of a balanced electrical circuit. The presence of benzol vapor creates an increase in filament temperature and consequently an increase in its resistance, which unbalances the circuit, causing a deflection of the meter pointer, proportional to the benzol concentration. Because of the indicator's sensitivity the presence of water vapor in air samples reaching the filament has a measurable effect on the electrical circuit. This effect is eliminated by placing a calcium chloride desiccator tube at the sample intake to remove all water vapors. A second tube filled with activated charcoal and calcium chloride serves as a benzol scrubber, making it possible to balance the electrical circuit in the presence of benzol vapors.

In addition to its use in the rubber industry the new benzol indicator will find application in paint, by-product coke, and chemical plants, and anywhere that benzol is encountered as a hazard to health and safety. For the detection and measurement of naphtha and benzine vapors, the less sensitive and less costly M.S.A. combustible gas indicator can be used. Mine Safety Appliances Co.


CLEAN AIR DISCHARGE
ACCESS DOORS FOR INSPECTION AND CLEANING
DOOR INTERLOCK SWITCH
COLLECTOR CELL
A.C. POWER SUPPLY
A CHARGED PARTICLES COLLECTED ON PLATES
HIGH VOLTAGE RECTIFIER
PRELIMINARY IONIZING
B ENTRAINED PARTICLES IN AIR ELECTRICALLY CHARGED
DUST LADEN AIR INLET
C PLATES CLEANED BY WASHING OR RAPPING COLLECTED MATERIAL INTO HOPPER

Cutaway View of Precipitron for Industrial Air or Gas Cleaning and Material Recovery

Courses in Rubber

(*Continued from page* 50)

recent developments in colloid chemistry and physics, the following topics will be discussed: (1) gel and film structures, including thixotropic and rheopectic systems; (2) wetting and dispersing agents; (3) modern synthetic products; (4) colloids in biology; (5) industrial applications of electokinectic phenomena; (6) industrial applications of base exchange reactions; (7) adsorption. In addition Dr. Hauser's regular evening course in colloid chemistry is being conducted again this year.

Ontario Rubber Meeting

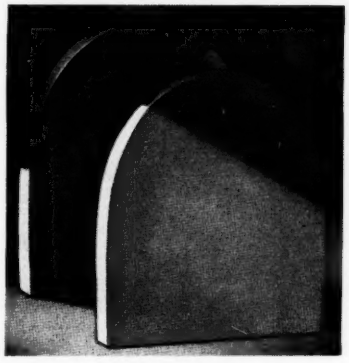
THE Ontario Rubber Section of the Canadian Chemical Association held its first meeting of the current season on November 10, 1938. Dinner at the Hart House, University of Toronto, was attended by 25; while 48 persons subsequently heard Professor Joslyn Rogers, of the University of Toronto, speak on "Chemistry before the Courts." The lecture was interesting and instructive in indicating the work of the chemist in various aspects of criminal investigation work. At the next meeting of the section, which will be held at McMaster University, Hamilton, Ont., at 8 p.m., December 7, E. R. Bridgwater, of E. I. du Pont de Nemours & Co., Inc., will speak on "The Evaluation of Synthetic Rubber-Like Materials."

Latex Adhesives

DUNTEX is the name given a group of latex adhesives for special purposes, several of which have found extensive application. Duntex-105, a moderately thick fluid which dries nearly colorless, is a quick-setting waterproof cement said to have excellent aging qualities. Principally employed in the building trade, it has found wide use for cementing wall board, plastic sheeting, insulating and acoustical tile, etc., to concrete, gypsum, plaster, wood, and other similar surfaces. Because it

(*Continued on page* 62)

New Goods and Specialties



Wrightred Toplifts

Inserting Rubber-Covered Plug in Paper Roll

Combination Heel

A RUBBER heel known as the Wrightred Toplift comprises two ¼-inch thick rubber segments of different hardness vulcanized together as a unit. The main heel section is of stiff rubber; while the outer back section is of softer and more resilient rubber. This construction is said to provide the desired support at the breast of the heel for health and comfort along with necessary cushioning qualities. Quabaug Rubber Co.

Round Belting

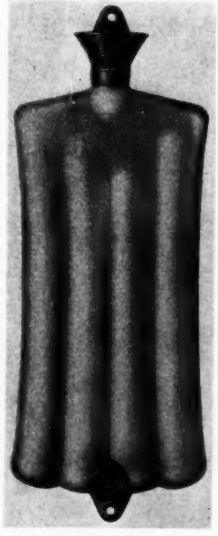
SAID to have greater driving efficiency than solid leather belting, a rubber and linen belting is made by braiding linen around an unvulcanized rubber core and then extruding tire tread stock over the braided linen core. The belting is then vulcanized. Because of the resiliency resulting from this construction, it is possible to preload the belt at the desired tension when making an installation. The belting, which at present is made in round $\frac{1}{16}$-inch diameter size, can be fastened with ordinary belt hooks. Sudbury Laboratory.

Newsprint Plug

A RUBBER-COVERED newsprint plug, comprising a steel core with a protective covering of thick rubber, is designed to facilitate the handling of large rolls of paper when loading and unloading from conveyances or in the newspaper plants. Similar in appearance to conventional metal or wooden plugs, the new rubber-covered product is 10 inches long and $2\frac{13}{16}$ inches in diameter and has on one end an eyebolt for attaching the hoist chain. A plug may be inserted quickly into each end of a roll of paper without danger of damaging the inner layers of paper and will not slip out when tension is applied to the hoist chains. The Goodyear Tire & Rubber Co.

Ribbed Water Bottle

MADE by the Anode process from latex, the Heatiator is a hot water bottle with three interior partitions running lengthwise and a ribbed exterior construction. This type of construction prevents bulging and is said to strengthen the bag greatly. Measuring 20½ by 8 inches overall, the new water bottle has a heating surface of 154 square inches. Owing to its length and flexibility, it may be wrapped around curved surfaces such as legs, arms, and shoulders. Miller Rubber Co., Inc.



Miller Heatiator

Workers' Fire Blanket

A FIREPROOF blanket, so mounted that it can be wrapped tightly around one's body in a few seconds without assistance, is being marketed by the Davis Emergency Equipment Co., in response to an increasing demand for this type of protection for laboratory and industrial workers. Normally this blanket is wound on a vertical roller, mounted on a wall or post. Should a worker's clothes catch fire, or should it be necessary for him to dash through flames to reach safety, he thrusts an arm through a catch-rope attached to the exposed edge of the blanket and, turning rapidly, wraps the blanket closely around him, thus extinguishing flames in his clothing or protecting himself from burns. The blanket, made of fireproofed and mothproofed wool, 80 inches long, is large enough to cover a large man completely. It is easily replaced on its roller and, when so mounted, takes up very little room. It is also suitable for extinguishing small fires by smothering.

Flat Tire Booster

THE Clemaco Tire Booster, which enables a motorist to transfer air from an inflated tire to a flat tire caused by a slow leak, consists of a ten-foot length of rubber hose with tire valve fittings on each end. One end of the hose is attached to the flat tire while the other end is fastened to the inflated tire on the opposite side of the automobile. The air in the inflated tire travels over into the flat tire until the pressure in the two tires is equalized. If the leak is sufficiently slow, the motorist will then have time to drive to a service station before the tire becomes flat again. The device, which is small and compact, may be conveniently carried in the glove compartment of the car. Cleveland Machine Co.

Rubber Industry in America

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. September quarter: net loss, $24,235, against $64,687 loss in the preceding quarter and net profit of $119,647, equal, after dividend requirements on $5 prior preferred and old $6 preferred stocks, to 5¢ each on 662,868 shares of common stock in the third quarter last year. Twelve months to September 30: net loss, $184,191, against net profit of $386,673 in the preceding twelve months.

Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y., and subsidiaries. Third quarter: net income, $97,057, equal to 23¢ a share on 421,981 capital shares, against $609,687, or $1.44 a share, in the 1937 period; manufacturing profit, $784,742, against $1,488,938; total income, $788,798, against $1,491,720.

Baldwin Rubber Co., Pontiac, Mich. Year to September 30: net profit, $19,986, after surtax on undistributed earnings, equal to 6¢ each on 316,757 shares of $1 par capital stock. Since the date of the company's fiscal year has been changed, no direct comparison is available, but for the nine months ended September 30, 1937, the net profit was $401,828, or $1.26 a share.

Barber Asphalt Corp., Maurer, N. J. Nine months to September 30: net loss, $168,653 against net profit last year of $629,649, or $1.61 each on 390,223 capital shares. Twelve months to September 30: net loss, $54,406, against net profit for $855,589, equal to $2.19 each for the twelve months to September 30, 1937.

Bibb Mfg. Co., Macon, Ga. Year to August 31: net income before federal income taxes, $957,918, against net income of $1,207,127 after taxes, equal to $6.04 each on 200,000 capital shares in the preceding fiscal year.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y., and subsidiaries. Nine months ended September 30: net profit, $1,944,459, including $3,726 profit on sales of securities and after deductions for federal income taxes, depreciation, depletion, and minority interests. The result was equivalent to $3.62 each on 537,406 shares of no-par capital stock, excluding 1,014 shares in the treasury. It compared with a net profit in the corresponding period last year of $3,386,067, including $263,408 profit on the sale of securities. This net was equal to $6.85 a share of capital stock. Current assets on September 30 totaled $5,841,471, including $2,711,715 cash and marketable securities; current liabilities were $910,990. A year earlier current assets were $6,287,206, with cash and marketable securities of $3,022,720 and current liabilities of $1,082,594. Inventories were $1,977,396, against $1,572,799.

Detroit Gasket & Mfg. Co., Detroit, Mich. Nine months to September 30: net profit, $14,955, equal to 26¢ each on 57,500 shares of $20-par 6% preferred stock. Net profit last year was $455,280, or $1.81 a share on 214,250 shares of $1-par common stock after dividend requirements on the preferred.

Flintkote Co., R.C.A. Bldg., New York, N. Y., and subsidiaries. Twelve weeks, ended October 8: net income $436,986, equal to 65¢ each on 670,346 shares outstanding, against $432,757, or 65¢ a share, in the same period last year. Forty weeks ended October 8: net income, $706,613, equal to $1.05 a share, against $1,091,990, or $1.63 a share, in the corresponding weeks of 1937. Year ended October 8: net income, $620,046, or 92¢ a share, against $1,160,172, or $1.73 a share, for the year ended October 9, 1937. Net sales: twelve weeks, $4,390,342, against $4,204,955; forty weeks, $11,689,700, against $12,418,165; fifty-two weeks, $14,435,402, against $15,373,695.

Monsanto Chemical Co., St. Louis, Mo., and subsidiary companies. Third quarter, ended September 30, net income was $731,353, which after deductions for preferred dividend requirements and minority interests in subsidiary companies is equivalent to 51¢ a share on 1,241,816 shares outstanding. This compares with earnings for the comparable period in 1937 of $1,179,999, or $1..06 a share on the 1,114,388 shares outstanding at the end of that period. Earnings for the first nine months of 1938 were $1,956,087, which after provision for preferred dividend requirements and minority interests equals $1.36 a share, against $3,955,259, equivalent to $3.55 a share in the first nine months of 1937. Third quarter domestic sales increased 21% over the second quarter of 1938, but declined 19% from the third quarter of 1937.

New Jersey Zinc Co., 160 Front St., New York, N. Y. September quarter: net profit, $798,246, equal to 40¢ each on 1,963,264 shares of $25 par capital stock, against $734,262, or 37¢ a share, in the second quarter and $2,172,145, or $1.10 a share, in the third quarter of 1937. Nine months to September 30: net profit, $2,185,104, equal to $1.11 a share, against $6,523,928, or $3.32 a share, the year before.

Raybestos-Manhattan, Inc., Passaic, N. J. Quarter ended September 30: net income, $245,184, or 39¢ per share, against a net loss of $302,351.30 during the first half of 1938.

Rome Cable Corp., Rome, N. Y. September quarter: net profit, $72,075, against net loss of $10,898 in June quarter and net profit of $32,806 in the September quarter of 1937. Six months ended September 30: net profit, $61,177, against $106,729 earned in the six months ended September 30, 1937.

Skelly Oil Co., Chicago, Ill., and subsidiaries. September quarter: net income, $695,180, equal, after preferred dividend requirements, to 60¢ each on 995,348 shares of common stock outstanding, against $1,911,022, or $1.80 each on 1,006,349 common shares in the corresponding period of 1937. Nine months to September 30: net income, $1,973,422, equal to $1.69 each on 995,348 common shares, against $5,346,940, or $5.02 each on 1,006,349 common shares, a year earlier. Twelve months to September 30: net income, $3,114,828, equal to $2.73 a common share, against $6,685,823, or $6.25, common share, for the preceding year.

Thermoid Co., Trenton, N. J., and domestic subsidiary. September quarter: net profit, $10,037, equal to 25¢ each on 39,956 shares of $3 preferred stock, against $16,109, or 40¢ each, on 39,956 preferred shares in the June quarter and $111,195, or 17¢ each on 469,823 common shares after preferred dividend requirements for the September quarter of 1937. Twelve months to September 30: net loss, $310,394, against net profit of $378,960, equal to 55¢ a common share for the year ended September 30, 1937.

United Carbon Co., Charleston, W.

Va., and subsidiaries. Nine months to September 30: net profit, $1,143,906, equal to $2.87 each on 397,885 common shares, against $1,917,108, or $4.82 a share last year.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. First nine months of 1938: net income, $6,212,823, against $16,726,520 in the same period last year; sales billed, $119,530,418, against $154,-839,997 in the corresponding period of 1937; orders booked, $113,170,228, against $191,200,758 in the 1937 period. Twelve months ended September 30: net income, $9,612,711, against $20,702,-105 in the preceding year; sales billed, $171,038,728, against $193,316,391 for the 1937 period; orders booked, $151,509,-531, against $239,573,704 in the corresponding period last year; unfilled orders, September 30, 1938, $43,817,402, against $78,155,632 on September 30, 1937.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. Nine months to September 30: net loss, $109,-477, against net profit last year of $331,-224, equal to $1.10 each on 300,000 capital shares. Surplus account after deducting loss of $109,477 for the 1938 period and dividends paid during the nine months of $223,200, amounted to $2,284,663.

Norwalk Tire & Rubber Co., Norwalk, Conn., and subsidiary. Year to September 30: net profit after $7,500 surtax on undistributed income $111,-195, equal after annual dividend requirements on 8,784 shares of $50 par, 7% preferred stock, to 40¢ each on 202,230 shares of no par common stock. Net profit in the preceding year was $63,711, or 16¢ a common share.

Statistics of Income, Rubber Manufacturing Industry[1]

The preliminary report of the Income Tax Unit, Bureau of Internal Revenue, Treasury Department, released October 5, 1938, containing statistics of income for 1936, provides data on the rubber manufacturing industry, shown below in comparison with corresponding preliminary statistics for 1935 and final statistics for preceding years. The gross income for this industry in 1936 was reported at $961,863,000, higher than for any other year back to 1930, prior to which it regularly exceeded a billion dollars. The number of companies reporting net income for 1936 was 330, a greater number than for any other year since 1928. Federal taxes paid by the industry, aside from excise taxes on tires, included $7,377,000 normal income tax, $1,143,000 surtax on undistributed profits, and $119,000 excess profits tax, a total of $8,639,000, higher than for any

(*Continued on page* 80)

[1] U. S. Department of Commerce, Rubber News Letter, Oct. 15, 1938.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Detroit Gasket & Mfg. Co.	Pfd.	$0.30 q.	Dec. 1	Nov. 15
Faultless Rubber Co.	Com.	$0.25 q.	Jan. 3	Dec. 15
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	Dec. 1	Nov. 15
General Electric Co.	Com.	$0.20 q.	Dec. 22	Dec. 2
General Tire & Rubber Co.	Com.	$0.50	Nov. 25	Nov. 15
B. F. Goodrich Co.	Com.	$1.25 q. final	Dec. 31	Dec. 9
B. F. Goodrich Co.	Com.	$1.25 q.	Dec. 31	Dec. 9
B. F. Goodrich Co.	Pfd.	$1.25 accumulated	Dec. 31	Dec. 9
Goodyear Tire & Rubber Co. (Can.)	Com.	$5.00 extra	Dec. 29	Dec. 15
Goodyear Tire & Rubber Co. (Can.)	Com.	$0.63 q.	Jan. 3	Dec. 15
Goodyear Tire & Rubber Co. (Can.)	5% Pfd.	$0.62½ q.	Jan. 3	Dec. 15
Hewitt Rubber Corp.	Com.	$0.10	Dec. 15	Dec. 2
Midwest Rubber Reclaiming Co.	4% Pfd.	$1.00 q.	Dec. 1	Nov. 19
Okonite Co.	Com.	$0.50 reduced	Nov. 1	Oct. 25
Okonite Co.	6% Pfd.	$1.50 q.	Dec. 1	Nov. 17
Raybestos-Manhattan, Inc.	Com.	$0.25 irregular	Dec 15	Nov. 30
Rubber Plantations Investment Trust	Com.	4% interim	.....	.....
United States Rubber Co.	8% Pfd.	$4.00 resumed	Dec. 23	Dec. 9
Westinghouse Electric & Mfg. Co.	Com.	$0.50	Nov. 30	Nov. 9
Westinghouse Electric & Mfg. Co.	Pt. Pfd.	$0.87½	Nov. 30	Nov. 9

Higher Export Quota for 1939

At its meeting on November 15 the International Rubber Regulation Committee decided to set the permissible export quota for agreement countries at 50% of basic quota. As 1939 initiates the new five-year period of rubber regulation, basic quotas of producing countries have been substantially increased. Thus the permissible quota of participating countries excluding Siam and French Indo-China for the first quarter of 1939 amounts to 56.5% on the basis of 1938 basic quota figures. The effect on world stocks of permissible exports for the fourth quarter of 1938 and the first quarter for 1939 and estimated world absorption for the same period is set forth in the following analysis.[1]

This amounts to 6.3 months' supply on the basis of the above estimated consumption. If world stocks decrease according to the above table, they will amount to 441,009 long tons, or 5.5 months' supply, at the end of December, 1938, and 413,229 long tons, or 5.1 months' supply, at the end of March, 1939. Although this analysis represents the general picture of the present world rubber position, unforeseen factors may conceivably alter the situation. The future consumption in this country is largely dependent on what happens in the automotive industry. The current feeling is optimistic and it is possible that consumption will run higher than the estimated figure of 40,000 tons monthly.

ESTIMATED MONTHLY EXPORTS FROM PRODUCING COUNTRIES

	Fourth Quarter, 1938				First Quarter, 1939			
	Basic Export Quota Long Tons	% of Basic Quota	Permissible Exports Long Tons	Estimated Actual Exports Long Tons	Basic Export Quota Long Tons	% of Basic Quota	Permissible Exports Long Tons	Estimated Actual Exports Long Tons
Agreement Countries excluding Siam and French Indo-China	107,938	45	48,572	48,572	122,042	50	61,021	61,021
Siam	3,333	100	3,333	3,333	3,417	100	3,417	3,417
French Indo-China	...	...	...	*4,559	5,000	100	5,000	5,000
Non-Agreement Countries	...	...	...	*2,187	...	...	...	a2,187
Total Estimated Monthly Exports	...	...	...	58,651	...	...	...	71,625

*This figure is an average of actual monthly exports for the period January to September, 1938, inclusive.

ESTIMATED MONTHLY WORLD ABSORPTION FOR FOURTH QUARTER, 1938, AND FIRST QUARTER, 1939

Average Estimated Monthly Absorption outside United States	40,885* Long Tons
Estimated Monthly Consumption in United States	40,000† Long Tons
Estimated Monthly World Absorption	80,885 Long Tons

*This figure is an average of actual monthly absorption for the period January to September, 1938, inclusive.

†This figure is based on the October, 1938, consumption figure and on the anticipated continuation of this level of consumption for the remainder of this year and the first part of 1939.

[1] Source of Statistics for Analysis—*Bulletin of International Rubber Regulation Committee.*

Based on the above estimates for exports and consumption, world stocks will decrease as shown below.

	Fourth Quarter 1938	First Quarter 1939
	Long Tons	Long Tons
Estimated Consumption	242,655	242,655
Estimated Export	175,953	214,875
Decrease in World Stocks	66,702	27,780

Crude rubber stocks outside of regulation areas amounted to 507,711 long tons at the end of September, 1938.

THE BEST INDUSTRIAL NO-ACCIDENT record ever reported to the National Safety Council is for 11,361,846 man-hours, or about 5,700 years without an accident. This world's record was set by employes of E. I. du Pont de Nemours & Co., rayon plant, Old Hickory, Tenn. It was terminated March 22, 1937. *Safe Worker.*

EASTERN AND SOUTHERN

IMPROVEMENT in business activity continues. Paced by further advances in steel and automobile production, industrial output last month rose to the high of the year. Manufacturing production advanced more than seasonally with the larger gains in the durable-goods industries. Construction contracts awarded in the first half of October rose 25% over the September daily rate and were 81% higher than in the corresponding period of 1937.

Steel continues its upward strides. In November steel operations went to about 62% of capacity, the highest since October, 1937, owing to several influences, but chiefly the demand from the automotive industry. Authorities feel, however, that the peak of operation this year may not come until December, for some mills will not be able to roll by the end of the year all the flat-rolled tonnage for which they are committed.

Leather shoe production in October, estimated at 34,500,000, was 18.6% higher than in October, 1937. This year's October rate also showed a less-than-seasonal decline from September, which pleasantly surprised the trade. Some believe the recent high production rate is due to the fact that retail sales have been running even with a year ago, but until recently production and buying had been greatly curtailed; now producers and stores must replenish supplies. Thus at showings last month of spring lines manufacturers reported good buying, but mostly for current selling; consequently the outlook for the spring is unusually favorable.

There is, however, a darker side to the business picture. The condition of the railroads still presents a serious aspect. Recent reports, moreover, indicate that crude oil production has been declining, with the figure from Texas down almost 25%.

National Automobile Show

"Automobiles for America's Progress" was the slogan for the 1939 National Automobile Show, held under the auspices of the Automobile Manufacturers Association at the Grand Central Palace, New York, N. Y., November 11 to 18. Eighteen makes of passenger cars and ten makes of commercial vehicles and more than 50 accessory and special exhibits were on display. Automotive manufacturers have generally lowered prices to encourage buying of the new models.

Wider bodies to give more room and the continuation of the emphasis toward comfort and safety are among the chief measures of the new cars. The adoption of the column mounted shift lever has become almost universal, and there has been a further use of front independent wheel suspension. Running boards have been reduced in width or even eliminated on some models. There has been little change in engine design on the new model. Pierce Arrow, one of the oldest American makes, has disappeared from the market this year.

New U.S. Royal Master bicycle tire for 26 by 1.25 rims, announced recently by U. S. Rubber Products, Inc. Of light weight, but sturdy construction and with safety features of the automobile tire, this new tire is designed to fit both Endrick English rims and hooked-edge American rims.

The trend toward a wider adoption of rubber continues this year, some manufacturers using more than 270 rubber parts, excluding tires. Newest form of rubber to find extensive use in the automobile is the sponge rubber cushioning material from foamed latex with interconnecting cells to allow the free flow of air through the cushion.

Latex Foam Cushioning

Cushioning from foamed latex is not new this fall, having been used previously for mattresses and upholstery in furniture, airplanes, and streamlined trains. However its introduction to the automotive field is of vital economic importance to the rubber industry. This form of cushioning has been adopted by Hudson and Nash this year as standard equipment on more expensive models and optional on others. Both of these cars use coil springs beneath the rubber cushion. The 1939 Bantam, also using the same type of material, dispenses with coil springs entirely. In this case the rubber cushion is substantially thicker to compensate for the elimination of springs.

Indications are that future development of this type of seat will be toward elimination of the coil springs, using rubber entirely as the cushioning material. To cushion one full width seat and back will require, it is estimated, 24 to 32 pounds of sponge rubber. If we assume automotive production to be 3,000,000 units (this figure is forecast for 1939 by the Automobile Manufacturers Association) annually with three-quarters of the cars requiring two full width seats, to cushion these cars would require 56,000 to 75,000 long tons of sponge rubber. On the basis of a pure gum compound, this would result in a 10 to 15% increase of rubber consumption in this country. As the sponge is made from latex, the consumption of latex would increase threefold here.

The new latex sponge has previously been used for arm rests and this year is being adopted by some manufacturers in the form of strips on top of the backs of front seats to protect riders in the rear seat when inadvertently thrown forward.

Other Rubber Uses

Rubber has been more widely adopted for the joints of shock absorbers, stabilizers, spring shackles, etc., as it prevents squeaks and reduces the number of lubrication points necessary. Packard has rear springs equipped with rubber and metal inserts at the ends of the leaves. Rubber is used extensively in independently sprung wheels as bumpers and in torsion for the joints. The torque ball, universal joint, and torque-ball retainers in the Buick torque-tube drive are supported by rubber-and-steel pedestal assemblies. In the new rear spring suspension developed this year by Cadillac, rubber bushings are applied in the shackles at three points. Rubber in the exhaust system supports of cadillacs and La Salles replaces rubberized fabric.

Truck Show

Simultaneous with the auto show, the fifth annual National Motor Truck Show was held in New York at the Port of New York Authority Building from November 11 to 17. The theme "Highway Transportation Serves Everyone" was the keynote of this exhibition. Reo and Studebaker trucks have utilized for seats the latex foam cushioning mentioned above. The seat cushions of Chevrolet and Mack trucks are padded with latex-impregnated hair interlaced to form a figure-8 pattern.

Ira Williams Joins Huber

Effective December 1, Ira Williams, who for several years has served as head of the Rubber Division, Jackson Laboratory of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., becomes associated with J. M. Huber Corp. as director of research with headquarters at Borger, Tex. Mr. Williams, who was born in Wilson, Kan., March 29, 1894, has contributed to many developments in the rubber industry. He is the author of numerous technical papers and has been granted patents of interest in this field. Active in the American Chemical Society, he has held, among other offices, those of vice chairman and chairman of the Rubber

Division. He attended Kansas University and Sterling College (B.A., 1916) and did graduate work in the universities of Chicago, Pittsburgh, and Akron (M.S., 1920).

After serving in the Gas Regiment during the World War, Mr. Williams returned to work on the Firestone Fellowship for the study of rubber at Akron U. and joined the Firestone Tire & Rubber Co. in 1920. In 1924 he went to Mellon Institute of Industrial Research on the Grasselli Fellowship for the study of rubber chemicals and became associated with the Grasselli Chemical Co.'s Cleveland organization in 1927. Two years later he was transferred to the Jackson Laboratory of E. I. du Pont de Nemours & Co., Inc., when the latter took over the Grasselli concern.

Last summer the University of Akron awarded Mr. Williams the honorary degree of doctor of science in recognition of outstanding accomplishments in the rubber industry.

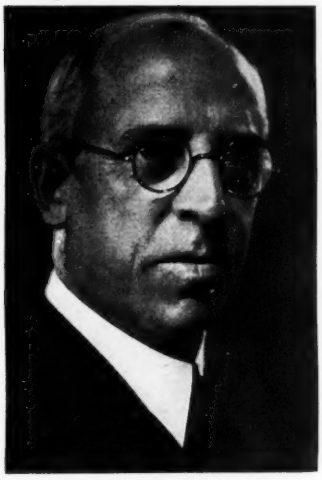
Louisiana Stabilizes Tax on Sulphur

Langbourne M. Williams, Jr., president, Freeport Sulphur Co., 122 E. 42nd St., New York, N. Y., announced on November 9 that he had received word from Baton Rouge of the ratification by popular referendum of a Louisiana state constitution amendment reducing the sulphur severance tax from $2 to $1.03 per long ton and providing for ad valorem taxes on sulphur in the ground with constitutional limitation.

Mr. Williams explained that action looking to readjustment of the sulphur tax basis was first instituted about a year ago when the Louisiana State Board of Commerce and Industry sought the Freeport company's cooperation in restoring production and resuming a $300,000 building program. The latter had been deferred following the raising of the tax to $2 in July, 1936, which also had necessitated curtailment of Louisiana's production.

Mr. Williams said that the $300,000 building and expansion program, undertaken in response to the board's request, is nearing completion and that the company has recently started an additional $120,000 construction project at the Port Sulphur, La., plant. Officials of the company, he said, estimate the tax readjustment will mean a net annual saving of about $250,000, based on the 1938 rate of production.

Bibb Mfg. Co., Macon, Ga., manufacturer of textiles including the new Bibb Heat Resistant Cord for tires, in a recent report by President W. D. Anderson at its annual meeting stated new business received since September 1 has enabled its mills to resume full-time operations. The company believes this upswing in business should continue for some time.



Herbert J. Winn

Lewis B. Swift

Taylor Instrument Changes

Herbert J. Winn, retiring president of the 87-year-old Taylor Instrument Cos., Rochester, N. Y., on November 9 became chairman of the board of directors and was succeeded in the presidency by Lewis B. Swift, vice-president in charge of engineering and research. Karl H. Hubbard was named chief engineer, in charge of engineering research and design, and Dr. H. L. Mason succeeded him as head of the research division. Other officers chosen by the directors include: vice presidents, P. Richard Jameson, Henry W. Kimmel, and Fred K. Taylor; treasurer, Herbert J. Noble; secretary, Henry W. Kimmel; assistant secretary, George H. Taylor.

Mr. Swift joined the company in 1904 after graduation from high school. In 1908 he entered Cornell University, but continued to work for Taylor during vacations. After receiving his M.E. degree in 1912, he rejoined the organization on a full-time basis. He was in the industrial sales department until 1919 when he organized and took charge of the sales engineering department. In 1928 he was elected a director and in 1929 chief engineer. Since 1934 was vice president.

Mr. Winn had served as president and treasurer for 25 years. When he joined the company in March, 1893, the Taylor line was composed of only household thermometers, clinical thermometers, and mercurial barometers; and the combined office and plant forces did not exceed 60 employes. The normal workng force has increased to 1,200 and the Taylor line now includes literally thousands of different instruments: For household and domestic science purposes; meteorology; medical diagnosis and treatment; as well as the vast specialized requirements of industry in measuring, recording and controlling temperature, pressure, rate of flow, and liquid level.

Swedish Manufacturers Visit America

Gustaf O. Osvald, general manager and, Mr. Holmberg, chief engineer, of Svenska Gummifabriks A.B., Gislaved, Sweden, sailed November 19 on their return trip after having spent considerable time in the United States inspecting American methods of manufacturing rubber products.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., recently purchased a 72-acre tract of land at Georgetown, S. C., and the buildings thereon. The property, on the Sampit River, has dock facilities for vessels of 30-foot draft. Construction and remodelling will begin at once. The first unit to be installed will be a plant for the production of sulphate of alumina. The company further reports that the chemical plant under construction in Mobile, Ala., is nearly complete. Other plants of the corporation in the South include those at Valdosta, Ga., Charlotte, N. C., Chattanooga, Tenn., and plants of partially owned companies at Panama City, Fla., and Brownfield and O'Donnell, Tex. American Cyanamid also owns Bauxite mines at Andersonville, Ga., and at Little Rock, Ark.

The American Society of Mechanical Engineers will hold its fifty-ninth annual meeting December 5 to 9 at the Engineering Societies Bldg., 29 W. 39th St., New York, N. Y.

Kelly-Springfield Tire Co., Cumberland, Md., finds the outlook brighter with the receipt of new business. Company officials declared the firm is not experiencing the usual seasonal decline in dealer sales, and they anticipate business will be better this winter than during the last one. Sales executives, inaugurating an intensive campaign for new business next year, recently held the first of several regional sales conferences in Cumberland.

(*Continued on page 62*)

OHIO

NEWS from Ohio is favorable. Thus a recent report indicates that the three largest rubber companies have restored the cuts made to salaried workers this past spring. The activity in the automotive industry naturally is reflected in increased output by the rubber industry.

1939 Tire Lines

Tire manufacturers recently revised their 1939 lines and made slight adjustments in prices of certain types and sizes. The more important changes are summarized below.

The Goodyear Tire & Rubber Co., Akron, O., is introducing a new first-line, "G 100 All Weather," to replace the "G 3 All Weather," which will take the place of the present second-line tire, "R 1," now to be discontinued. Third- and fourth-line tires are to be retained with the exception of the "Speedway," now designated as the "Pathfinder," incorporating only minor alterations in design.

The B. F. Goodrich Co., Akron, will retain the first line "Life Saver Tread Silvertown," introduced early in 1938, and the fourth-line "Commander." For a second line the firm will reintroduce the Silvertown which was first line prior to this year. The "Standard," second line for 1938, will be third line in 1939. The present third line, "Cavalier," is to be discontinued.

The Firestone Tire & Rubber Co., Akron, is introducing the "Imperial," a premium tire made with "Rayodipt" cord which will be priced at 168% of the standard first-line tire. The firm is also presenting a new first-line, or 100 level, tire known as the "Champion" with a new "Champion Leakproof Heavy Duty Tube." "Convoy" at 75 level and "Sentinel" at 65 level will remain unchanged. In addition the company is introducing "Firestone Life Protector," a "tire within a tire;" this tube is designed so that if blowout occurs the air in the inner chamber will be retained until the car can be brought to a controlled stop. Truck tire lines are being continued without change.

The United States Rubber Co., 1790 Broadway, New York, N. Y., is introducing for 1939 a new premium tire called the "U.S. Royal de Luxe" which will be priced at 107½% of the standard first-line tire. Other lines which remain the same as for 1938 are: the "Royal Master" at the 168 level; the Royal at 100 level; and the "U.S. Tire," which ranges from 70 to 90% of the first-line tire price.

The Seiberling Rubber Co., Akron, announces the following line-up on its tire lines: premium: "Seiberling Safety Tire" and "Duo Tread Air Cooled:" first line: "Special Service;" second line: "Standard Service;" third line: "Portage."

The General Tire & Rubber Co., Akron, has added for 1939 the "Brigadier," a new line of low-price passenger and truck casings and tubes.

The Lee Tire & Rubber Co., Conshohocken, Pa., and The Dayton Rubber Manufacturing Co., Dayton, O., do not announce any change in their tire lines at this time. The Norwalk Tire & Rubber Co., Norwalk, Conn., has added 15- and 16-inch bus tires to its line for 1939.

O'Neil on Business Here and Abroad

"Any one discouraged or downhearted about present-day conditions in America should go to Europe for several months, and he will come back to his own country realizing that life is pretty good here after all and that Americans do not know what adversity is, as most Europeans do," said William O'Neil, president of the General Tire & Rubber Co., Akron, on his return here after spending several months in the principal countries of Europe. "Even when times have been at their best in Europe, the best of their workmen have not been as well off as the worst of our workmen, when times have been worst here. When I saw conditions as they are in Europe today, I came to the conclusion that we're not used to trouble, in America, as they are over there."

Mr. O'Neil further stated, "Some politicians have tried to persuade us that America succeeds because of its natural resources and because it is a comparatively new country. Go to Europe, and you will see the fallacy of this. Relatively there are more natural resources in Rumania than there are in the United States, just as there are in Brazil or Canada, but this country has gone ahead of all of them, because it has known better how to sell. But we still have a lot to learn about selling.

"I was interested in comparing conditions as I saw them in the various countries of Europe with our conditions here at home. Business is good in Holland, pretty largely, I believe, because Holland has no intention of going to war. France has been trying some of the same economic and political experiments that have been tried here lately, and they haven't been working out at all. The 40-hour week doesn't sound so bad, but it has upset things in France very much. While Germany is busy, it has no money and can do very little business abroad. I was in Germany at the peak of the recent war crisis, and a number of Germans told me that the German people do not want war with any one. I was amazed at the lack of information throughout Germany as to what is happening from day to day, either at home or abroad.

"While on a business mission to the plant in Poznan, Poland, where Stomil tires are made under General's direction for Poland, I found Poland one of the sanest nations I visited. There is neither Bolshevism nor Naziism there. Poles still greatly admire Woodrow Wilson, and one sees statues of him on every hand.

"I came home from Europe convinced that the most important thing for us in America to do is to learn our own particular jobs better. We must concentrate on better salesmanship, both at home and abroad."

Stressing the point that America has 95% of the best labor in the world and that at least 80% of our employers are the best in the world, Mr. O'Neil said, "At the lowest point of the recent depression, employes of Akron-controlled rubber companies worked 75% as many hours as at the peak of good-time production, and today the rubber industry has more employes than at any previous time in its history and more hours are being worked than ever before.

"In the production of mechanical rubber goods, labor accounts for more than 40% of the total cost.

"Moreover it is only natural and reasonable that machinery should be devised and developed to lower production costs. Labor-saving machinery has been largely responsible for the increase of more than 500%, in the past five years, in the production of mechanical rubber goods. Such machinery has not cut down hours of labor. In fact, the majority of men who are employed today are so employed because of labor-saving machinery that has been developed in the past five years."

Goodyear Activities

The Goodyear Tire & Rubber Co., Akron, recently held a LifeGuard demonstration at the city airport, attended by more than 3,000 motorists. The following Goodyear executives were present to greet local business men, officials of the Akron Safety Council, Akron Chamber of Commerce, Akron Automobile Club, and other organizations sponsoring safety programs: President Paul W. Litchfield, Vice President and Sales Manager R. S. Wilson, and Secretary W. D. Shilts.

Runs were made down the plane runway in which passenger tires were punctured by steel spike studded plates or blown out with dynamite caps. While the car traveled at about 80 miles an hour, there were likewise motorcycle and huge truck trailer LifeGuard runs made during the demonstration.

The LifeGuard consists of an inner tire inside a conventional appearing tube; and when a casing blows out or is punctured, air escapes immediately

from the outer tube, but can escape from the inner tube only through a tiny vent, thus allowing the driver ample time to bring the car to a safe stop.

Recently eight business men of New Orleans, La., received bronze plaques and membership in the LifeGuard Legion, the national safety organization sponsored by Goodyear, designating that the recipients had averted a serious accident after tire failure on the highway through the use of LifeGuards. The presentation was made by N. F. Hertzer, district manager for Goodyear, and T. A. Cheney, manager of Goodyear Service Stores.

Bond Redemption

On December 30, 1938, Goodyear will call for redemption of the entire issue of its First Mortgage and Collateral Trust 5% Bonds due May 1, 1957, and outstanding in the amount of $52,365,500, according to President Litchfield. The bonds, callable at 102 and accrued interest at any time on thirty days' notice, were originally issued in the amount of $60,000,000 in 1927 to refund higher coupon obligations. But the outstanding issue has been gradually reduced to its present level as result of purchases for a sinking fund.

Concurrently it was announced the company has completed arrangements to sell $40,000,000 20-year First Mortgage and Collateral Trust 3½% Bonds to insurance companies, which together with a $10,000,000 five-year bank credit at about 2¼%, will represent the only funded debt of the corporation.

It is estimated that completion of the present refunding operation will result in an annual saving in interest to the company of more than $1,000,000 the first year, or approximately 50¢ per share on 2,059,060 shares of common outstanding on June 30, 1938.

Transferred to Sweden

Vice President C. C. Slusser has announced three more assignments to the new Goodyear factory at Norrkoping, Sweden: J. D. Campbell will be superintendent of division A; Lee Young, superintendent of division B; and John Hoesly, in charge of development. These three men, with Val Follo, previously named superintendent at the Swedish plant, will sail to their posts late this month.

New Tires

Goodyear is now marketing two new tires: the G-100 All-Weather for passenger cars and the Hi-Rib tractor tire. Features claimed for the new All-Weather follow: 33% more tread mileage; safe, All-Weather Center traction; greater resistance to punctures, bruises, and blowouts; quiet, easy roll-riding, plus fluted modern styling. The Hi-Rib is for the use on front wheels of tractors where greater ease of steering and resistance to side-slip are required than is provided by the conventional rib design.

The rubber company also announced that the 1939 Chrysler Custom Imperial has as standard equipment the new de luxe Goodyear Rayotwist Double Eagle tires and LifeGuard inner tubes. Other 1939 Chrysler cars will wear the new G-100.

Macy Parade Balloons

Goodyear, as usual, made balloons this year for R. H. Macy & Co.'s fourteenth annual Thanksgiving parade. The figures, of lightweight fabric inflated with helium, included: Uncle Sam, a 75-foot balloon leading the procession; Ferdinand the Bull, 43 feet long, 32 feet high, with a chest expansion of more than 13 feet; and a team of acrobats, a small one balancing a huge one on his shoulders, in all 68 feet high.

M. C. Meyer

Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, recently held its annual conference of the sales organization, at which discussions covered new products and improvement in standard lines as well as strictly sales and sales promotion matters. According to Sales Manager H. P. Schultz, optimism for improved business conditions was expressed by representatives from all sections of the country.

On November 3, Mr. Schultz announced that M. C. Meyer, formerly territorial representative in the Toledo district, had been named to the newly created post of assistant to the sales manager. Mr. Meyer has had long experience in both production and sales of Republic products.

Goodrich News

Aircraft manufacturers now use 142 different sizes and types of airplane tires, according to The B. F. Goodrich Co., Akron, which is reported to have built the first tires for airplane use in 1906.

New Latex Sponge Rubber Department

Goodrich recently announced that its newly created Latex Sponge Rubber Department is now in production. It will produce latex sponge rubber seat and back cushions, mattresses, and pads to the specifications of railroads, bus, truck, and motor car manufacturers. All these products will be marketed in conjunction with the Goodrich hair and latex decking material known as Nukraft.

New Auto Heater

Goodrich has announced its new Model 81 hot water automobile heater with twin-fan circulation and double defroster outlets, circular foot-warmer outlets to direct heat around the passengers' feet, and with a connection for throwing heat into the rear of the car. Temperature regulation is controlled by a valve which governs the flow of hot water.

Vibro-Insulators for Church Bell

When the new Baptist Church was built at Fries, Va., the problem arose of where to place the 1,900-pound bell, the vibration from ringing it would eventually weaken the tower constructed. Placing the bell in the yard seemed the only course open until someone suggested installing the bell on rubber mountings. In consequence it was mounted on four No. 1 Vibro-Insulators made by Goodrich. These rubber-to-metal shear type mountings are designed to carry a maximum load of 500 pounds; so one was attached to each of the four legs of the bell frame. Tests then showed that all damaging vibration had been eliminated, and the bell now reposes in the church belfry.

Battery Data

A bulletin issued by Goodrich engineers explains why the automobile storage battery, which so often gives flawless service during the hot months, needs extra care to guarantee such performance during the winter: "Exhaustive studies have shown that a storage battery in good condition is 100% efficient when the temperature is 80 above, but only 42% efficient at zero. The action inside the battery cell is of a chemical nature, with the acid acting on and through the plates. As it becomes colder, plate materials contract, and the pores become smaller, while at the same time the acid becomes thicker and heavier. Combination of the acid with the material in the plates, which produces battery current this becomes more difficult. . . .

"While a fully charged battery is 42% efficient at zero, if only half charged, its efficiency will be only 25%. The car owner would be attempting to operate with one-quarter of a battery. . . .

"Car owners should have batteries tested every two weeks in winter. Plates should always be covered with water to prevent their upper parts from drying out while the remainder is immersed in concentrated acid. Cables and terminals should be inspected regu-

(*Continued on page 62*)

NEW ENGLAND

A RECENT survey of modernization activities in the major New England industries revealed that local manufacturers for the past two years have been engaged in a large spending program that will run through 1939. Amounts ranging from one thousand to more than one million dollars have been expended in an attempt to produce higher quality products more efficiently and at less cost to the ultimate consumer. The survey indicated that most manufacturers are directing the spending program to modernizing and replacing outmoded machines and equipment, designing and installing special machines for specific operations, and redesigning products to meet competition from other areas.

Rubber manufacturing payrolls in Rhode Island in October were 8.3% lower than for September, but 7.8% better than for October, 1937. The total rubber industry payrolls for October, 1938, according to the Brown Bureau of Business Research, aggregated $252,934. Eight manufacturers of rubber goods reporting to the State Department of Labor on the number of wage earners in their plants based on figures for the week ending October 15 showed a gain of 1% over the number employed in September and 0.4% over the number in the corresponding period of 1937. In October, 1937, the number employed in these plants was 3,670; in September, 1938, 3,648; and in October, 1938, 3,685.

The United States Rubber Co. has awarded a contract to raze a four-story warehouse at its plant on Fairmount St., Woonsocket, R. I., which was badly damaged by the hurricane of September 21, as the entire top story of the building had been blown off. The other buildings of the plant are being repaired and renovated.

Employes of the Bristol, R. I., wire plant of United States Rubber Products, Inc., will hold their fifth annual Christmas party December 22 in the recreation hall. Features of the affair, which in the past has attracted as many as 600 persons, will include entertainment, distribution of gifts by "Santa Claus," refreshments, and dancing.

Arts and Crafts classes, supervised by the WPA recreation division, have been established for young men and women employed at the Bristol plant. Those for the women began November 28 and are to continue on Monday evenings. The classes for the young men were organized the following night and will be held every Tuesday and Thursday nights. Made possible by increased recreational facilities at the plant, the classes will be in charge of WPA supervisors. Recently opened for the benefit of employes of the plant are two well-equipped social and reading rooms.

Fisk Anniversary

On November 1, Col. Charles E. Speaks, president, Fisk Rubber Corp., Chicopee Falls, Mass., commemorated the company's fortieth anniversary, when he also declared a bright future lies ahead for the tire industry in 1939. Commenting on the scientific progress made since the founding of the Fisk Rubber Co. in 1898, Colonel Speaks predicted that equal advances would be made during a similar period immediately ahead.

The first Fisk automobile tire, he stated, was built in May, 1900, when the company's factory consisted of one building and a small power plant. Twelve good tires resulted from the first month's production. By October the total had reached 177. One year later intensive research resulted in the revolutionary "bolted-on" type of tire. This was the first of many inventions and improvements which later included the multiple cable bead, automatic blending unit, automatic control individual tube vulcanizer, the first individual tire vulcanizer, and anti-friction cord. Today the company holds more than 550 basic patents for rubber manufacturing and tire building.

From one building the factory has grown to include 29; the 3½ acres have expanded to 21 acres of ground and 40 acres of floor space. Starting with less than 50 persons, the company now employs more than 3,500.

Retreading Increase Predicted

More than 35,000,000 pounds of tread rubber will be used in retreading and recapping in 1939, with business 20% greater than in 1938, according to H. W. Brown, sundry sales manager of the Fisk Tire Co. His prediction is based on the tremendous growth of this phase of the tire business in the past five years, particularly in the truck tire field.

To meet present demands, Mr. Brown added, camelback must have a long curing range to give the retreader a wide margin of safety in his curing process.

Precautions should be taken, he warned, to overcome the following obstacles against a perfect job: low temperature in molds due to loss of heat between boiler and molds; incorrect temperature due to inaccurate gages or thermometers; high temperature due to wrong advice; too long or too short curing time; and high or low inflation pressure in curing tube.

To Fight Auto Taxes

Colonel Speaks on November 16 advised the 30,000,000 motorists in the United States to form a lobby to protect themselves against increasing motor vehicle taxes, which he stated, had advanced 380% in 15 years.

Legislatures in most states this winter will consider 7,000 to 8,000 bills affecting motorists and the automobile industry, he further declared, and about 1,000 will be enacted.

"It is the personal responsibility of all motorists," Colonel Speaks said, "to see that these bills do not affect them adversely.

"Today they are paying one out of every seven tax dollars collected by federal, state, and local agencies. These motor taxes reached a new peak of $1,585,000,000 last year, and they have increased more than $1,200,000,000 in 15 years, jumping every year."

The Armstrong Rubber Co., Inc., manufacturer of automobile tires and tubes, West Haven, Conn., has started work on an addition to its warehouse, another story 80 by 180 feet.

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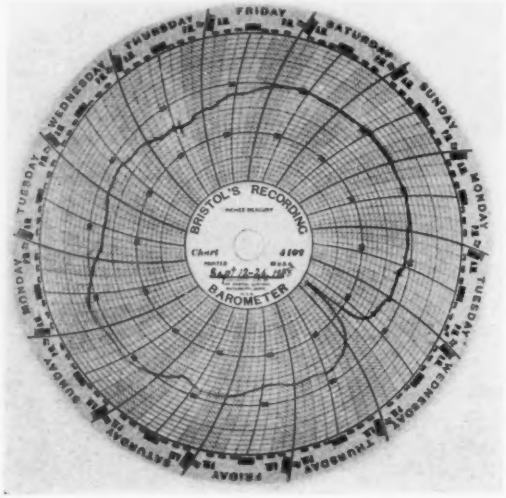


Hurricane Barometer Record Shown in the Chart of the Period September 12 to 26, 1938, at Waterbury, Conn., from a Recorder in the Plant of the Bristol Co. Powered by a Spring-driven Clock, This Instrument Registered the Unprecedented Drop in Barometric Pressure Which Extended from 1 a.m. to 9 p.m. September 21

MIDWEST

REPORTS from the Midwest are encouraging. A recent survey reveals that rubber products recorded an expansion in employment and payrolls considerably in excess of the average for all industries in the district. Thus 35 rubber manufacturing firms had 16,079 workers earning $442,000, 10.7% rise in workers and 18.4% in earnings over the previous month. The total group reporting showed 13,059 companies paying $31,993,000 to 1,196,262 employes, a gain over the previous month of 7.5% in wage earners and 8.8% in earnings.

The automobile industry also continues its good showing. Last month a weekly production of 96,735 units was estimated, the high for the year, and greater than in the corresponding week of 1937. The automobile shows throughout the country reported excellent attendance and good buying interest. Field stocks of cars are still below normal.

Crane Laboratories Inspected

A large group of scientists, engineers, and business executives were guests of the Division of Engineering and Research of the Crane Co., valve manufacturer, when it held open house on November 8, 9, and 10 at its enlarged laboratories at 42nd St. and S. Kedzie Ave., Chicago, Ill., which are used for the study of valves, piping, fittings, packing, and fluid flow. The 255 members of the staff, headed by Dr. L. W. Wallace, director, showed the visitors devices which subject metals to 200,000 pounds' pressure, 200,000 pounds' tension, and temperatures of 3200° F., and devices which can peer into metals to a depth of 10 inches and magnify them 6,500 times. A miniature foundry was seen in operation; while a sanitation and hydraulics laboratory revealed a variety of tests for plumbing and steam-fitting materials. A thermal laboratory indicated what is being done to make more efficient devices for maintaining comfortable temperatures.

Rubber Tires Successful on Lake Bottom

Jerry Nett, of Albany, Minn., recently turned over two acres of grass and thistle-filled muck bottom on the floor of Pelican Lake and converted it into a clean, sandy swimming beach. His equipment consisted of an ordinary gang plow drawn by a farm tractor on Firestone Ground Grip tires, which had sufficient flotation on the oozing lake floor to keep the heavy tractor from sinking and which gave so much traction in the slippery muck that Mr. Nett could operate his tractor in the same gears he uses on dry land. The front tires were submerged most of the time.

Monsanto Awards

The Columbia, Tenn., plant of the Phosphate Division of Monsanto Chemical Co., St. Louis, Mo., recently was awarded for this year the Monsanto starred pennant signifying that its appearance, cleanliness, landscaping, safety devices, locker and washer rooms, fire protection, and other factors of service to and protection of employes combined to make it the outstanding unit in the group made up of Monsanto's six largest American plants. Besides each employe of the plant received a flashlight made of Monsanto products, hearing the inscription: "Monsanto Star Plant, 1938. Columbia, Tenn."

The award was based on a detailed inspection by a board of operating executives appointed by Charles Belknap, executive vice president, consisting of A. L. Gardner, works manager, Merrimac Division, Everett, Mass.; Norman C. Hill, manufacturing superintendent, Plastics Division, Indian Orchard, Mass.; Wm. G. Krummrich, manufacturing superintendent, Monsanto Division, Monsanto, Ill.; B. E. Thomas, manufacturing superintendent, Monsanto Division, St. Louis; F. N. Williams, plant manager, Phosphate Division, Columbia; and Jas. W. Irwin, assistant to President Edgar M. Queeny, executive offices, St. Louis.

In announcing the award Mr. Belknap stated, "Good housekeeping in an industrial plant is something that must be worked at every day by every employe—supervisor and workman alike. A plant in which housekeeping is kept on a high plane is a plant in which employes have more favorable working conditions, less danger of accidents, and conditions that lead to greater operating efficiency. Both the employe and the employer gain."

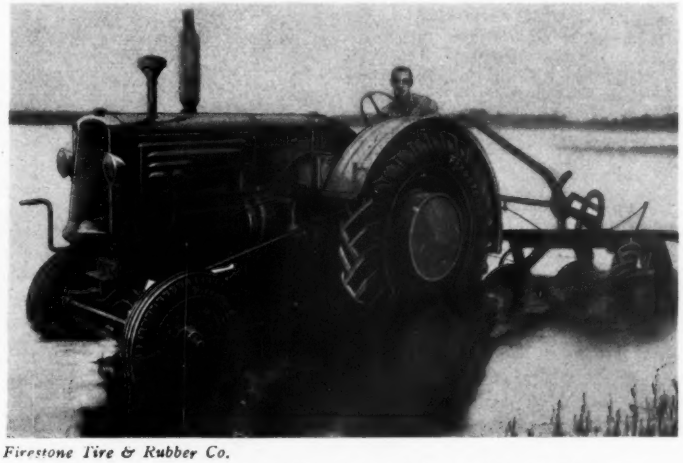
The annual star-pennant award for the smaller plants went to the Carondelet, Mo., plant of the Phosphate Division. The inspection committee appointed by Mr. Belknap for this group was composed of F. S. Hatch, assistant to the vice president in charge of the Merrimac Division; J. C. Jordan, production superintendent, Nitro, W. Va., plant; L. K. Cowie, plant manager, Camden, N. J.; and W. G. Neil, operating superintendent, Norfolk, Va., plant.

New Issue of Preferred Stock

Monsanto on November 18 filed with the Securities and Exchange Commission statement covering the issue of 50,000 shares of no par value $4.50 cumulative preferred stock, Mr. Queeny announced. This will increase the number of issued preferred shares of the company to 100,000, an issue of 50,000 shares having been released in July, 1937. The additional 50,000 shares will be alike in every particular with the 50,000 shares now outstanding. Common shares outstanding total 1,241,816.

Proceeds of the new issue will be added to the cash funds of the company. According to the registration statement, cash funds have been, and may be called upon, among other things, for expenditures upon capital additions, replacements and improvements to plants, processes, and facilities for the manufacture of new products and to meet the increased demand for old products and the continual changes in processes and equipment normal in the chemical industry.

In 1937 and 1938 approximately $11,200,000 will have been spent on such projects. Monsanto contemplates continuing capital expenditures for such purposes.



Firestone Tire & Rubber Co.

Plowing Lake Bottom with Farm Tractor Equipped with Firestone Ground Grip Tires

The company's earnings for the twelve-month period ending September 30, 1938, cover the dividend on the new issue and on the previous cumulative preferred issue approximately 6½ times.

Smith, Barney & Co. is expected to be underwriter of the issue. The shares will be offered on or about December 8, 1938.

Canadian Sales Office for Plastics

As a further step in expanding the sales and service facilities of its Plastics Division, Springfield, Mass., Monsanto opened a sales office in Montreal, Canada, at 378 St. Paul St., W., which also houses the sales offices of Monsanto Canada, Ltd. According to John C. Brooks, Monsanto vice president in charge of the Plastics Division, L. C. MacLeod will have charge of the new office.

This is the first time that extensive sample and stock facilities have been available for Canadian users of Monsanto plastics products, which include cellulose acetate and cellulose nitrate sheets, rods and tubes, cellulose acetate molding powder, cast phenolic resins, polystrene molding powders, and Vue-Pak transparent packaging materials.

A Fuel Engineering Conference will be held December 14 at Columbia Hotel, Kalamazoo, Mich., by engineers of the Kalamazoo valley region and Appalachian Coals, Inc., Cincinnati, O. This meeting will be the twenty-fourth in a series of educational enterprises. Some of the papers to be read follow: "The Modern Small Power Plant," by H. L. Solberg, professor of mechanical engineering, Purdue University; "Combustion Practices and Experiences with Underfeed Stokers," G. G. Zimmerman, test engineer, Indiana Service Corp.; "Some Fundamentals of Smoke Abatement," J. F. Barkley, supervising engineer, fuel economy service, mechanical division, United States Bureau of Mines; "Combustion of Pulverized Coal," a discussion illustrated with colored motion pictures, presented by E. G. Bailey, vice president, Babcock & Wilcox Co.

Goodrich News

(*Continued from page 59*)

larly and replaced if worn or broken. Worn cables will not carry the current satisfactorily and are one of the causes for poor battery performance.

Sales of the storage battery industry for 1938 should top those of 1929, according to S. B. Robertson, Goodrich president, who predicted that 1938 sales would exceed $92,000,000, 18% more than in last year. The increase, he believes, results from the revival in domestic shipbuilding, increased railroad electrification, and the current upswing in automobile output.

Eastern and Southern

(*Continued from page 57*)

Baldwin-Southwark Corp., Philadelphia, Pa., has transferred Chester H. Gibbons from the Eddystone, Pa., plant to the Ohio district in charge of sales of products of the Southwark Division, to succeed A. Q. Davis, recently appointed shop superintendent of the corporation.

Hewitt Rubber Corp., Buffalo, N. Y., has appointed the following new distributers: Joseph Glenn & Sons and its affiliate, E. P. Alexander & Sons (Clifton Heights, Pa.), Philadelphia, Pa.; Tools & Supplies, Inc., a new firm, headed by E. W. Bromwich, Indianapolis, Ind.; Campbell Hardware & Supply Co., Seattle, Wash.; Laurence Belting Co., New York, N. Y.; and Everson Electric Co., Allentown, Pa. These new distributers operate under the exclusive Hewitt franchise plan, handling the manufacturer's complete line. Each carries a representative stock of industrial rubber goods and specializes in "spot" warehouse deliveries.

The Thirteenth National Exposition of Power and Mechanical Engineering will be held from December 5 to 10, inclusive, at the Grand Central Palace, New York, N. Y. According to last reports, over 270 exhibitors have reserved space at the show.

Murray Rubber Co. has awarded a contract for the erection of a one-story factory building at Milby and Burch Sts., Houston, Tex., at a cost of about $20,000. The structure will be 60 by 120 feet, have a wing 20 by 24 feet, and be of metal lath, plaster, and steel sash.

M. Barbanell, formerly head of the crude rubber department of Hermann Weber Co., 67 Broad St., New York, N. Y., has organized his own company, M. Barbanell, Inc., 80 Broad St., New York, to conduct the inportation of and the dealing in all grades of crude rubber.

Rubber Trade Association of New York, Inc., 95 Broad St., New York, N. Y., held its annual meeting on November 10, at which the following were unanimously elected directors for the ensuing year: Robert Badenhop, A. Bendixsen, Philip Billhardt, Wm. E. Bruyn, A. L. Grant, Louis V. Keeler, J. Louis, H. Muehlstein, and D. A. Paterson. Then the following officers were elected: president, Mr. Muehlstein; vice president, Mr. Grant; treasurer, Mr. Keeler. B. G. Davy was reappointed secretary-manager.

The United States Labor Department recently announced the awarding of several supply contracts including: John A. Roebling's Sons Co., 107 Liberty St., New York, N. Y., wire, cable, and reels, for the War Department, $24,316; Roebling's Trenton, N. J. office, cable, Philadelphia Navy Yard, $21,656; O. W. Jackson & Co., 290 Fifth Ave., New York, mats and matting, for the Treasury Department, indefinite amount; S. S. White Dental Mfg. Co., 500 Fifth Ave., New York, dental supplies, War Department, $11,787.

New England

(*Continued from page 60*)

Cable Raincoat Co., 68 Northampton St., Boston, Mass., has announced through Robert P. Cable that it has leased Building No. 8 from the Meade Rubber Co., Stoughton, Mass., for the purpose of manufacturing raincoats. Mr. Cable further stated that the firm expects to employ 150 people at this plant and operate the year round. The company also has offices at 1350 Broadway, New York, N. Y., and at 1041-A Merchandise Mart, Chicago, Ill.

The Apex Tire Co., Inc., purchased from the Berk Lace & Braid Co., both of Providence, R. I., the former plant of the Lumb Knitting Co., at Pawtucket, to be used for rebuilding automobile tires. The plant contains about 63,000 square feet of floor space.

John M. Bierer, factory manager, Boston Woven Hose & Rubber Co., Cambridge, Mass., recently addressed chemistry students of Boston University on "Rubber."

Leather Finish, Inc., manufacturer of Rex compounds for latex, has changed its name to Malrex Chemical Co. as the former name did not truly designate the line of business. The address, Malden, Mass., remains unchanged. Rex compounds are used for stabilizing and thickening of latex, dispersing pigments and curing agents in latex, bonding rubber and pyroxylin, increasing the adhesion of rubber to cloth, and for many purposes in the paper and textile industries.

Latex Adhesives

(*Continued from page 52*)

is resistant to alkalies and water, it is particularly adaptable for work with concrete, and a promising field is opening up in the attachment of linoleum to concrete. It can also be used for cementing fabrics, felt, imitation leather, paper, fabric-backed veneers, etc., to various types of building surfaces or for laminating or joining such materials.

Duntex-110, although similar to 105, is somewhat more fluid and has been found to be superior for use with smooth surfaces. Duntex-103, a fluid, and Duntex-111, a paste, have proved effective for waxed and greasy surfaces. Duntex-106 and 107 are used for protective and waterproof coatings.

NEW JERSEY

NEW JERSEY rubber manufacturers look for better business with the new year. Some plants are experiencing a little pick-up in certain goods; while others report no change in production.

Jos. Stokes Rubber Co., Trenton, has announced several changes in its executive personnel. Wm. J. B. Stokes, II, former secretary, has been named president; Charles L. Fulkert, former superintendent, was elected vice president; Bertram Stromberg, with Price-Waterhouse Co., secretary; Joseph Bauer, formerly with The Thermoid Co., general manager, and T. C. Eastham, former correspondent clerk, assistant treasurer.

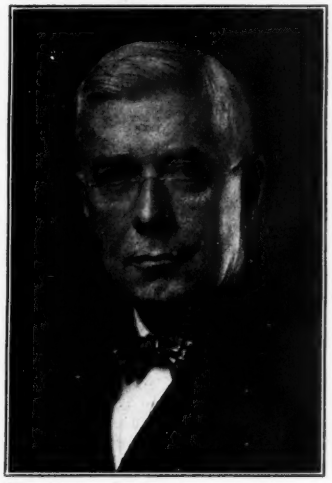
Under the will of Robert J. Stokes, late president of the Stokes company, his only son, William J. B. Stokes, II, is given $15,000 cash, and all jewelry, clothing, and personal effects. Chief beneficiary of the estate, the value of which has not been determined, is Mrs. Velma Dixon Stokes, widow, who will receive the residue of the estate, Upon her death her son, when he reaches the age of 30, will receive $50,000, and later he will get the entire residue. Trenton hospitals were also left money by Mr. Stokes.

Milton H. Martindell, former executive of the Jos. Stokes Rubber Co., Trenton, will soon incorporate the Martindell Hard Rubber Molded Plastic Co. He will lease a manufacturing plant on the outskirts of Trenton and become associated with Pittsburgh interests in the production of hard rubber plastic goods. Mr. Martindell was with the Stokes company for 32 years and is still a stockholder. He started as a bookkeeper and some years later was made secretary. Ten years ago he became vice president, treasurer, and general manager.

Acme Rubber Mfg. Co., Trenton, finds conditions have improved during the past few months.

Thermoid Co., Trenton, in a letter to employes by President Fred Schluter, stated there will be no change in the company's policy on the "closed shop." He believes a closed shop is against the best interests of both the management and men and that the company would lose considerable business, resulting in less work for employes. He declared he had no objection to anybody joining any union voluntarily, but that employes should not be made to join a union and have dues and assessments deducted from their wages.

Essex Rubber Co., Trenton, experienced a good summer and expects business to continue fairly good the remainder of the year.



The Parker Studio

Col. Arthur F. Townsend

Manhattan Rubber Fete

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, on October 28 celebrated the forty-fifth anniversary of its founding and incorporation. The original plans of its founders called for a concern, The Knickerbocker Rubber Co., in Paterson, N. J., but this was changed when an offer was made to finance the first building if the plant were built in Passaic. With the acceptance of the offer the company's name also was changed, to The Manhattan Rubber Mfg. Co. January 1, 1894, witnessed the start of manufacturing operations in a small building, 50 by 150 feet, having 40 employes. Now Manhattan employs about 3,000 workers in a plant covering 800,000 square feet of floor space. Auxiliary factories are at Whippany, N. J., Neenah, Wis., and North Charleston, S. C.

Manhattan also was one of the first American rubber manufacturers to grow plantation rubber. The company sent a representative to the Far East in 1910 to search for a crude rubber supply. The result was a plantation in Java from which the company now receives an increasing supply of its crude rubber needs.

Many of the products first made by Manhattan have become obsolete, including solid rubber buggy tires, clincher-type bicycle tires, horseshoe pads, and early types of beer bottle stoppers. Yet other products of the first years are still in great demand in improved forms, as rubber transmission belt, hose, molded goods, rubber matting and tiling, billiard table cushions, rubber covered rolls, and abrasive wheels. Besides its many products in the industrial rubber goods field, Manhattan now is one of the largest manufacturers of brake linings and clutch facings for original equipment in the automotive industry.

Frank Cazenove Jones, Manhattan's first president, was responsible for the financing and the planning of the company. Forced to retire in 1903 because of ill health, he was succeeded by Col. Arthur F. Townsend, who remained as president until 1929, when the company, as a result of a merger, became part of Raybestos-Manhattan, Inc. Colonel Townsend then became chairman of the board of the new organization and general manager of the Manhattan division. He is also the American member of the Advisory Panel of the International Rubber Regulation Committee.

Three other early executives of the Manhattan company are still active: F. L. Curtis, assistant general manager of the Manhattan division and treasurer of Raybestos-Manhattan, who had been manager of the company's original factory office; C. T. Young, factory manager, who had been assistant to Mr. Curtis in the early days; and Margaret A. Hogan, Colonel Townsend's secretary and the company's first office employe. Henderson M. Green, now vice president of Raybestos-Manhattan, joined the rubber company later.

Mercer Rubber Co., Hamilton Square, expects business to show a better trend after the first of the year, when conditions are expected to become more settled.

The Okonite Co., Passaic, through Treasurer A. F. Metz has announced that through the issue of a 4½% 15-year debenture issue in the amount of $1,500,000, privately placed, the company refunded its 6% debentures due in 1942 and paid up existing bank loans.

Puritan Rubber Co., Trenton, reports business has not picked up any of late. Miah Marcus, of Roxbury, Mass., treasurer of the Puritan company and of American Tile & Rubber Co., Trenton, has been elected president of the concern to succeed the late Frank Berenstein. No other changes were given.

Trenton City Manager Paul Norton has informed owners of several industrial plants where serious damage was caused by overflooding of a creek that steps will be taken to end the nuisance. The Jos. Stokes Rubber Co. and the Crescent Insulated Wire & Cable Co. were among the companies affected.

ELEVATOR PRECAUTIONS. Never operate an elevator unless you know how and have the authority. Be careful when loading or unloading elevators. When loading material, make sure it is completely on the elevator platform. N. S. C.

LATIN AMERICA

Peru

Preliminary statistics compiled by the Peruvian Tire Importers' Association indicate an increase in total imports of tires during the first half of 1938 as compared with the first and second semesters of 1937; the respective amounts were 432,718, 416,700, and 375,972 kilos. Shipments were mostly from the United States, which increased its share from 272,408 kilos in the first half of 1937 to 306,019 kilos in the second half of that year and again to 334,212 kilos in the first six months of 1938.

Because of the weakening tendency of Peruvian currency, tire prices were increased by 5%, effective June 22, 1938. If this tendency becomes more marked, an additional increase of 5% is expected shortly.

On July 12, 1938, an order was issued prohibiting the use of solid tires by trucks running on all interurban avenues between Lima, Callao, and suburbs. Owners were given three months in which to withdraw such vehicles or equip them with pneumatic tires.

A slight but steady increase is noted in the interest of Peruvian farmers in pneumatic tires for tractors.

Panama

Reports from Panama state that a local firm, collaborating with a manufacturer of leather shoes, is to erect a factory for making rubber-soled canvas shoes. Hitherto the entire local demand for this type of footwear has been covered by imports from Japan and Czechoslovakia.

Mexico

Fabrica de Artefactos de Hule Eureka S. A., Manuel Mara Contreras No. 25, Mexico, D. F., according to President Miguel Pastor Artigas, held a directors' meeting on October 12 at which the resignation of General Manager Francisco Larrondo was accepted. His successor, Dr. Francisco Pastor Artigas, was then chosen.

Brazil

There are now reported to be 44 rubber goods factories in Brazil which give employment to about 5,000 skilled workers and annually produce articles having a total value of about $4,000,000 (U. S. currency). In the state of Para are four factories which together have an annual output of more than 60,000 tires and 300,000 inner tubes; these amounts will be increased to 250,000 tires and 500,000 tubes when a recently opened factory in the Federal District gets into its stride, thereby covering the greater part of local consumption.

A plan originated by the Brazilian President embodies a proposal that the country's chief creditors: the United States, Great Britain, and France, should allow 5% of their rubber imports to originate in Brazil. On the basis of net imports into these countries during 1937, according to statistics compiled by the Commodity Exchange, Inc., this would represent a total of 38,000 tons.

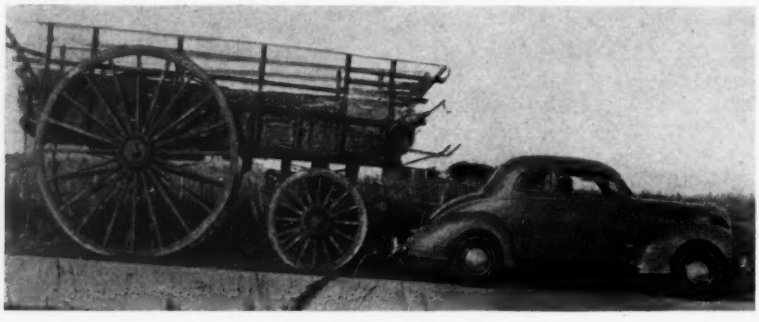
Following is a table showing the annual shipment of crude rubber from Brazil since 1900 (figures in long tons):

1900	26,323	1920	23,216
1901	29,809	1921	17,216
1902	28,433	1922	19,542
1903	30,942	1923	16,765
1904	30,329	1924	23,165
1905	32,624	1925	25,298
1906	34,274	1926	24,298
1907	36,817	1927	28,782
1908	37,420	1928	21,129
1909	38,874	1929	21,148
1910	37,938	1930	14,260
1911	35,970	1931	12,121
1912	41,619	1932	6,420
1913	35,659	1933	9,883
1914	33,001	1934	8,903
1915	34,610	1935	11,275
1916	30,997	1936	14,216
1917	33,461	1937	15,576
1918	22,303	1938*	7,500
1919	32,726		

*Six months only.

Tires vs. Wheels

When C. E. Perkins, of Akron, was driving across the great, open treeless pampas of the Argentine Republic in South America, he encountered a farmer's wagon that furnished a striking example of the way huge wheels can keep a wagon from sinking into soft earth. Although the rear wheels on the Argentine farm-cart are twice as high as Perkins' entire car, they served not even so well to prevent the vehicle from sinking into soft ground as the low-pressure General Jumbo streamline tires on Perkins' car. Both vehicles, shown herewith, form a striking contrast between primitive and modern transportation.



Sinking into Soft Soil Stopped by Size or Softness

OBITUARY

Israel Laurie

ISRAEL LAURIE, president of the Somerset Rubber Reclaiming Works, New Brunswick, N. J., since 1910, died on October 2. He had also been a partner in the New Brunswick Iron & Metal Co. from 1906 to 1920. The deceased, who was born in Russia, Christmas Day, 1868, is survived by his wife, one son, and five daughters. Funeral services were conducted on October 3. Burial was in Van Liew Cemetery, New Brunswick.

Luther Martin IV

KILLED when his private plane, which he was piloting, crashed in Illinois on November 15, Luther Martin IV was on a business trip to Chicago in his capacity of representative for C. K. Williams & Co., mineral color and pigment concern, Easton, Pa., which he had joined April 1, 1934, after resigning as secretary of Wilckes, Martin, Wilckes Co., lamp black manufacturer. The deceased, who was born in Washington Valley, N. J., 35 years ago, leaves his wife, his father, and two small children. Funeral services were held November 18 in Morristown, N. J.

"Flexarc Welding Cable." Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. 2 pages. Tough protective jackets containing 60% rubber are used on the Flexarc welding cables described in this leaflet. Data is given on three types of cables: electrode, ground, and electrode holder.

"Hewitt Oil and Gasoline Hose." Hewitt Rubber Corp., Buffalo, N. Y. 4 pages. This folder describes and illustrates three Maltese Cross products: tank truck hose, curb pump hose, and synthetic distillate hose. The latter is designed for service on tank truck reels where the hose is continuously filled with oil. Also a brief description is given of Hewitt Monarch distillate hose, Duroil tank truck hose, Monarch propane and butane hose, and Wallabout gas burner hose.

Rubber Industry in Europe

GREAT BRITAIN

Rubber Floors for Cows

A good floor for a cow-house should be durable, resilient, warm, impermeable, continuous, and sufficiently rough to prevent slipperiness, authorities on breeding dairy cattle state, and they have found that resilience and warmth, but more especially the former, are of the greatest economic importance to breeders. With these requirements in view it was natural to turn to rubber in searching for the ideal floor, and since 1933 the Hannah Dairy Research Institute, Kirkhill, Ayr, has, with the cooperation of certain firms, been investigating the use of rubber and rubber plastics for floors in cow-houses.

Results of the investigation, described by Alexander Burn Fowler in the *Scottish Journal of Agriculture*, indicate that in general rubber plastic flooring material offers more advantages than rubber blocks or rubber mats. The main difficulty in using rubber blocks is the tendency to rupture at the joints; this, Mr. Fowler pointed out, is bound to occur so long as the paving block is more resilient than the jointing material. As for rubber mats, while they are durable, impermeable, and do not allow seepage, they are very difficult to fix in position and, what is worse, are very slippery.

These defects are not met with in plastic flooring properly prepared and laid by an expert. Rubber plastic flooring consists chiefly of some powdered material as powdered asbestos, rubber, cork, marble and granite chips, or cement, mixed with latex. They are ideal for cattle byres, for when properly laid, they give floorings with all the necessary qualities. They are easily repaired; parts showing undue wear can simply be cut out, and the places refilled with plastic material that can be spread to give a perfectly sealed joint. These floors are said to be somewhat expensive to install, costing about 20s. (at prevailing prices) per standing, but the considerable extent to which "hot feet," big knees, and swollen hocks are avoided in cows more than makes up for the extra expenditure.

Automobile Conference

A successful automobile conference was held at the Empire Exhibition, Glasgow, on October 14, under the auspices of the British Rubber Publicity Association in collaboration with the Scottish sections of the Institution of the Rubber Industry and the Institution of Automobile Engineers. The conference formed part of the activities of the Advisory Committee established in connection with the Rubber Pavilion at the exhibition.

Colin Macbeth summarized his paper on "Rubber in Automobiles," copies of which had been distributed to all at the conference. In the course of his talk Mr. Macbeth stated that in time rubber suspension would replace metal leaf springs such as are at present employed.

Industrial Estate

Scottish Industrial Estate at Hillington, near Glasgow, Scotland, sponsored and financed by the British Government, to alleviate unemployment in special areas of the country by offering to the manufacturing community excellent industrial facilities such as to attract new industries and branches of existing industries to those areas, which started development in June, 1937, reports that 120 factories now are either completed or under construction and industrial tenants have been secured for about 80. The offer to the manufacturing industry is threefold: first, a new factory, built, if necessary, according to a manufacturer's special requirements, on lease, thus requiring no outlay of capital, and at low rent as the Estate company does not operate for a profit; second, financial assistance for plant, machinery, and working capital; and, third, contributions toward certain overhead expenses, as rent, rates, and income tax. These latter remissions may be at any rate up to 100% for five years, but it is unlikely that these latter concessions will be obtainable after March, 1939.

Notes

The United Kingdom Duties Advisory Committee has announced that it will consider applications to exempt from import duty certain additional classes of machinery, including that for sewing leather and rubber.

The British Rubber Producers' Research Association will have a research station near Hoddesdon, Herts.

The Reliance Rubber Co., Ltd., London, has increased its capital of £12,000 by an additional £23,000 divided into 8,000 ordinary and 15,000 preference shares of £1.

X-ray analysis and investigation of the structure of rubber is being undertaken at Queen Mary College, University of London, by Dr. C. J. B. Clews.

Whitby at Teddington

Dr. G. Stafford Whitby, director of the Division of Chemistry, National Research Council, Canada, and formerly professor of chemistry at the McGill University, Montreal, has been appointed director of the Chemical Research Laboratory, Teddington, to succeed Sir Gilbert Morgan, who retired September 30. Dr. Whitby, who is expected to take up his new duties early in 1939, received the first Colwyn Medal awarded by the Institution of the Rubber Industry in 1928.

Proofing Association

The rubber proofing trade recently formed a new organization, Rubber Proofers' Association. The new body will not incorporate price agreements; its objects are to secure mutual support and cooperation in all matters affecting the general and common interests of the members, particularly in connection with rates, wages, and employment conditions; to elect persons to represent members of the association on any trade board, national or district joint industrial councils, or similar bodies; and to protect the commercial interests of the members. The following firms cooperated in forming the association and have stated their intention of becoming members: J. Mandelberg & Co., Ltd.; A. O. Ferguson & Co., Ltd.; Ioco Rubber & Waterproofing Co., Ltd.; Ferguson, Shiers & Co., Ltd.; P. Frankenstein & Sons (Manchester), Ltd.; Springfield Mills (Radcliffe), Ltd.; Greengate & Irwell Rubber Co., Ltd.; Proofings Ltd.; James Wilson & Co., (Manchester) Ltd.; Zama, Ltd.; and Frank Walters & Co., Ltd.

Gas Masks

During the recent war scare a large number of gas masks were distributed to the civilian population, and the government apparently has decided to allow the masks to be retained. The many accounts of abuses of these masks suggests that if the government is not to be faced by a not inconsiderable financial loss, to say nothing of difficulties when the time arrives when the masks will actually be needed, it will have to begin now an educational campaign to instruct citizens on their proper care and to impress on parents that gas masks were not primarily intended as playthings for children or as handy containers for assorted odds and ends, as many appear to believe.

GERMANY

Buna Properties

Among the papers presented at the eleventh annual meeting of the Deutsche Kautschuk Gesellschaft, Hamburg, September 26-28, was one by Paul Nowak and Hermann Hofmeier on The Effect of Rubber-like High Polymers on the Physical Properties of Buna Mixes." For the experiment a 33% basic mix of Buna S and one of Perbunan were prepared. The first, containing no black, corresponded to a cable insulation compound, and the second, to which 5.3% durex black was added, was a sheath compound. The other compounds used in the tests were made from these basic mixes by replacing one-third (by volume) of the Bunas by the rubber-like thermoplasts concerned, namely Oppanol B, Oppanol C, Oppanol C, Plexigum B, and Plexigum D.

It was found that these additions considerably modified the properties of the Buna mixes in certain directions. In general the physical strength of the stock was reduced, but at the same time milling and extruding were facilitated and resistance to ozone increased. It is pointed out that for the purposes for which the compounds were intended, high tensile strength is not necessary. The inclusion of Oppanol in Buna S mixes appears to have a particularly favorable effect on the insulation properties of the mixes, which makes such combinations especially suitable for insulation purposes. On the other hand where sheath compounds are required with a high resistance to heat, Perbunan and Plexigum mixes give good results.

Further experiments will have to be carried out to determine the proportions and thermoplasts to be used to obtain optimum results in the different applications.

Imports and Exports

Germany's crude rubber imports continue to decrease as compared with those for 1937; in August, 1938, 73,339 quintals were imported, against 89,080 quintals in the same month of 1937; for the first eight months of 1938 crude rubber imports totaled 628,787 quintals, against 621,632 quintals in 1937. The difference in favor of the current year (due to the comparatively smaller imports in the early months of 1937) has practically disappeared.

Exports of manufactured goods declined from a total of 129,197 quintals, value 31,003,000 marks, in the first eight months of 1937 to 108,184 quintals, value 27,634,000 marks, in the corresponding period of 1938. The drop was particularly marked in the exports of tires and tubes of all kinds. Shipments of automobile tires fell from 190,424 units in the 1937 period to 125,634 units in 1938; automobile tubes dropped from 99,561 to 86,856 units; cycle tires, from 1,302,025 to 889,156 units; and cycle tubes, from 1,569,473 to 843,511 units.

Rheydt Report

Kabelwerk Rheydt A.G., Rheydt, Rheinland, reports that the business year ended June, 1938, was very satisfactory; earnings increased from 6,600,000 marks in 1936-1937 to 9,600,000 marks, and the firm was able to pay a dividend of 12%, against 10%, on a capital of 12,000,000 marks, despite the considerable increase in amounts written off, the increase in taxes and imports, and the large sums set aside for reserve. Progress is reported in the use of home produced raw materials. Sales increased both in the domestic and foreign markets, and the firm had to work in shifts. Prospects for the current year are considered bright.

Achema IX

The Achema IX, Chemical Engineering Show, organized by the Dechema, German Society for Chemical Engineering, will be held at Frankfurt a.M., June 28 to July 7, 1940, on the occasion of the general meeting of German Chemists and of the Second International Chemical Engineering Congress, also to be held at the same time in Germany.

U. S. S. R.

Hydrochloric Acid in Sovprene

At the rubber factory Kauchuk frequent cases were observed of extensive corrosion of apparatus, especially vulcanizing press platens, used in working up Sovprene mixes. This corrosion, Ginsburg and Derechinskaya state in a recent article,[1] is due to the action of hydrochloric acid. A certain amount of HCl is present in Sovprene, the Russian synthetic rubber based on chloroprene, and it is suggested that additional amounts are formed when the various volatile substances containing chlorine, which are retained in Sovprene, are liberated during vulcanization and disintegrate. The amount of HCl found may be as much as 0.6%, but Sovprene mixes containing metal oxide give off only 0.03% HCl, and the corrosive effect is considerably less than with pure Sovprene.

The continuous action of even comparatively small amounts of HCl is capable of causing a considerable amount of corrosion, and suitable preventive measures must be adopted. It has been found that if 1.5% of soda is added to the Sovprene mix, no HCl at all is separated, and the steel platens are practically not affected. It has been suggested to bathe Sovprene articles in water glass (containing about 15% alkali) before vulcanizing, as a protective measure, or to include soda in the Sovprene mix. But before the latter can be definitely recommended, careful tests must be made to determine its possible effect on the formation of pores in the mixes during curing.

[1] *Rubber and Caoutchouc*, 5, 22-26 (1938).

Imports and Exports

Russia is importing less crude rubber, available statistics indicate. During the first half of 1938 imports totaled 14,377 metric tons, against 16,904 tons in the corresponding period of 1937. No comparative figures are given for exports of rubber goods during 1937, but for the first half of 1938 totals were 355 metric tons, value 1,322,000 rubles.

New Tire Factory

It is reported that a factory has been erected in Moscow where better-grade automobile tires and tubes are to be produced by way of experiment.

HOLLAND

Fol Resigns

J. G. Fol, director of the Technico-Commercial Department of the Rubber Foundation and chairman of the editorial committee of the foundation's organ, *Rubber*, has resigned, and Dr. A. J. Ultee, head of the Publicity and Patents Department, has been appointed acting director and also acting chairman of the editorial committee of *Rubber*. Dr. R. Houwink has been named director-general of the Research and the Technico-Commercial Department of the Rubber Foundation as from January 1, 1939. He was formerly connected with the National Rubber Service at Delft.

Utrecht Agricultural Fair

At the Agricultural Fair in Utrecht, September 7 to 16, the Rubber Foundation had a stand where an illustrated pamphlet on "Rubber in Agriculture" was distributed and on display were various tires for agricultural vehicles—for carts, tractors, wheelbarrows, etc.—floor coverings for stables, rubber horseshoes of a type said to be very successful on horses for the mounted police in Amsterdam; horse collars with a special air tube. Different applications of sponge rubber were also shown, including a saddle for tractors, pads for the harness of horses and as filling for horse collars, etc. These and other uses for rubber in field, dairy, and stable, are discussed and illustrated in the pamphlet.

Rubber Joints for Sewers

A brief article on rubber jointing for sewer pipes appears in the November, 1938, issue of *Rubber*. Rubber rings, having a circular cross-section with a

(*Continued on page* 68)

Rubber Industry in Far East

NETHERLAND INDIA

Native Rubber Report

"The 33rd Report of Native Rubber Cultivation," covering the first half of 1938, shows clearly the quick reaction of native rubber production to low prices, not only as regards quantity, but also quality. While on the one hand tapping has dropped considerably, even in some of the important rubber districts, on the other hand there was a distinct deterioration in the quality of the product and a temporary setback, at least, for government efforts to improve methods of preparation.

Comparatively more rubber was shipped in the form of blankets, an indication of the production of a greater proportion of slab which must be remilled before it can be exported to consumer countries. This, of course, was due to the fact that in the period under review the difference in the prices of sheet and slab did not encourage the production of the former, a circumstance further reflected in the imports of mangles, which have undergone a steep reduction, in many cases amounting to total cessation. Similarly natives found it did not pay to produce smoked sheet, and a number of smoke houses have been closed.

Apart from all this, economic conditions in the rubber districts have been adversely affected. Cash income of owners fell sharply, and although tappers have been getting an increased share of the crop harvested, their daily wages have dropped considerably, in some districts to as little as 15 to 20 guilder cents. As a result of this decline the purchasing power of the natives has naturally been severely crippled, and imports of the various articles natives use, as food, clothing, sewing machines, little luxuries as canned fish and fruit, have undergone drastic cuts during the first half of 1938 as compared with the same period of 1937.

Stock for Buddings

An extremely interesting experiment in bud-grafting that seems likely to have far-reaching results is being carried out at the General Experiment Station of the A.V.R.O.S., and is reported by J. F. Schmole.[1]

Several years ago Dr. P. J. S. Cramer remarked that since seedlings resulting from the pollination of *Hevea Spruceana* by *Hevea brasiliensis* showed markedly better growth than seedlings from seed of *Hevea brasiliensis*, buddings on the hybrid stems very likely also show much better growth and yields than buddings on *Hevea brasiliensis* stock. Consequently it was decided to test this theory in the experiment garden Polonia, and in 1931 buddings from the AV clones, 49, 50, and 256 were grafted on to stems grown from *Hevea brasiliensis* seed and from *Hevea Spruceana* hybrid seed. Unselected *Hevea brasiliensis* seed was planted in nursery beds in September, 1928, and the hybrid seed, obtained from the Cultuurtuin at Buitenzorg, was planted, during February-April, 1929, also in nursery beds. Both types of seedling were budded in January, 1931, and stumps were planted in the fields at the end of February, 1931, all the buddings of one clone being arranged in one row and in such a way that two buddings on *H. bras.* stems alternated with two on *H. Spruc.* hybrid stems. Half of the buddings were thus on *H. bras.* stems and half on *H. Spruc.* stems, 12 buddings being taken from each of the three clones in each case; that is there were 72 buddings altogether. Shortly after planting a few of the plants died, but were not replaced. Judging from the tables in the report, the plants that died were all on *H. bras.* stems.

In June, 1935, the buddings were tapped for the first time, when they were in their fifth year. The girth measurements taken each year were consistently larger in the case of the buddings on *H. Spruc.* stems than on *H. bras.* stems; yields in the first tapping year averaged less per tree per annum for the former than for the latter, but in the succeeding years this result was reversed; output of buddings on *H. Spruc.* increased rapidly over that of buddings on *H. bras.* stems, and in 1937 the difference in favor of the former averaged almost 25% for all three clones. The thickness of the renewed bark, too, was greater in the case of the buddings on *H. Spruc.* stems. These very encouraging results suggest that larger-scale experiments should be carried out with several clones on stems resulting from different crosses with *H. Spruc.*, Mr. Schmole concludes his report.

[1] *Arch. Rubbercultuur*, 3 (1938).

Notes

According to data supplied by the Central Bureau of Statistics, 608 estates in Netherland India, having a tappable area of 109,577 hectares, stopped tapping everywhere at the end of August. 1938; in addition 436 estates ceased tapping on part of their plantations, putting an additional 135,282 hectares out of tapping, to make at the end of August 244,859 hectares, or 46.3% of the tappable area of estates, out of tapping.

The Netherland India Government has approved the constitution of the newly formed Singapore Rubber Works (Java) Industries en Handelsmaatschappi at Bandoeng. The objects of the new company are to erect, acquire, and exploit factories for the production of gas masks and industrial goods made of rubber and allied materials. The capital is 150,000 guilders divided into 150 shares of 1,000 guilders each, of which the Singapore Rubber Works, Ltd., has 149; while one is held by the Ned. Handel Mij. The first directors are Lionel Cresson, Singapore, M. J. Wouters, of Batavia, and H. Nijhoff, of Bandoeng.

The Volksraad has passed a bill providing for a Government Agricultural Enterprise in New Guinea, to consist of an estate of 1,000 hectares north of the Ransiki River on the east coast of Geelvink Bay. It is intended to grow chiefly rubber, but experiments with other crops will also be conducted. New planting up to 5% of the existing area in Netherland India is permitted under the new rulings of the International Rubber Regulation Committee. Producers will receive permits for not more than 4¾%, the balance to cover the above enterprise, presumably. Incidentally the permits to producers will be transferable up to a certain date yet to be indicated.

PHILIPPINES

Following the collapse of its business in Shanghai, the Singapore Rubber Works, Ltd., which has factories for the production of mechanical rubber goods in Singapore and Netherland India, has opened a sales office in Manila.

LIBERIA

Rubber exports from Liberia for 1937 were 7,074,835 pounds, of which 5,042,167 pounds went to the United States. Over 50% of the shipments to the United States were in the form of latex.

MALAYA

New Planting

At the fourteenth annual conference of the Incorporated Society of Planters, Penang, September 23-25, various papers by members of the Rubber Research Institute of Malaya and by practical planters were presented on different aspects of the topic, "New Planting on Reserve Jungle." The papers, published in a special supplement of *The Planter,* the organ of the society, included the following: "The Development of Jungle Reserve Land for Planting Rubber," General recommendations prepared by the Botanical, Pathological and Soils Divisions of the Rubber Research Institute of Malaya; "New Planting on Reserve Jungle Land, Further Notes on 'Burning,' 'Covers' and 'Manuring,'" C. G. Akhurst, R. R. I. M.; "The Preparation and Planting of a New Clearing on Hilly or Undulating Land," M. E. Wright, Prang Besar Estate; "Matters to Be Considered in Opening up New Areas," J. E. Pearce, Kamparmalim Estate; "Recommendations on the Choice of Planting Material; Clones and Clonal Seedlings," C. E. T. Mann, R. R. I. M.; "Choice of Hevea Planting Material," G. S. Reis, Batu Kawan Estate; "Diseases and Pests of New Plantings of Hevea," F. Beeley, R. R. I. M.; "Root Disease and Underground Pests in New Plantings," R. P. N. Napper, R. R. I. M.

The Choice of Planting Material

Undoubtedly the most important and provocative of the above papers were the two discussing the choice of planting material, the one by a well-known member of the Rubber Research Institute, and the other by a planter of many years' experience, both representing opposing points of view.

Mr. Mann, the scientist, states his stand quite clearly at the very outset. Says he: "During the past two years the relative merits of buddings and clonal seedlings (seedling families derived from good parent clones) for use in large-scale planting, on replanted and on new areas have been the subject of much discussion.

"It may be stated at once that we shall have no preference for buddings over 'clonal' seedling families or *vice versa* when it has been demonstrated by reliable comparative tests that the seedling families are equivalent in value, both in production and in secondary characters, with buddings of the best proved clones."

But he points out, "For the present, the *legitimate* seedling families which have been proved to be equivalent in yield and in other important characters, to buddings of the best proved clones . . . are very limited in number."

Consequently he considers that: "The extensive planting of unproved material cannot be justified. We, therefore, strongly advise against the planting of clonal seedings in preference to buddings on more than an experimental scale."

He emphasizes that only a few of the original families of clonal seedlings, obtained by carefully controlled hand-pollination, have been shown to be equivalent in productive capacity with buddings of the best proved clones. Discussing isolated seed gardens, he states that these were established because it was thought it would prove impracticable to produce sufficient quantities of seed by means of artificial pollination for commercial planting. The establishment of isolated seed gardens planted with a limited number of carefully selected parent clones has given promise of success. But Mr. Mann is dubious about the results of mass production of seed from isolated gardens. In any case final proof of the true commercial value of the seed progeny from isolated gardens is still lacking.

Referring particularly to work in Java, he then shows that large-scale hand-pollination has now been found practicable. Before giving details as to the best buddings and seedlings to use in planting, Mr. Mann again says emphatically:

"Only legitimate seedlings, that is to say seedlings obtained by controlled crossing by hand, of the best of the legitimate families which have already been 'proved' by tapping tests extending over several years, can at present be regarded as the possible equivalent in value of buddings of the best proved clones."

Buddings Debunked Within 20 Years?

Practically the exact opposite point of view is expressed by Mr. Reis, an experienced planter, frankly against buddings for commercial planting. Looking ahead 20 years, he says that in that time budding will be "debunked" by practically every estate and that it will be used only as a scienitfic means to an end. He brings out a few important points that to his mind indicate this trend. First, with few exceptions, clones are constantly being discarded for something which supersedes them. Then there are adverse secondary characters which arise with almost every clone.

"Brown bast, the poor and slow bark renewal of some clones in commercial tapping, wind-damage risks, burrs on tapping panels, drying-up of tapping panels, and other adverse features are showing themselves up to a degree which I—personally—think were not considered possible some years ago. This inclines me to the view that in 20 years or less, the budding of rubber for commercial areas will be a thing of the past.

"I consider that the future lies in clonal seed. By that I mean that all planting or replanting of rubber will be done on estates using clonal seed alone, and that budding itself will be left to the scientific institutes."

If an exact method could be devised for determining the yield of seedlings, at say six months of age, and the seedlings from clonal seed grow normally and show no adverse characters, then Mr. Reis considers such a stand should eventually give better results than any buddings.

INDO-CHINA

July exports of crude rubber from Indo-China came to 5,221,763 kilos, to bring the total exported for the first seven months of 1938 to 29,517,821 kilos.

HOLLAND

(*Continued from page* 66)

diameter of 20 mm., have been used for sewer pipes having a diameter of about one meter by the municipality of The Hague, and the system has offered various advantages. First the cost was not one-tenth that incurred when lead-wool was used as packing, a saving due not only to the difference in the cost of the material, but also in labor. Also the joint is waterproof, preventing leakages; while because of its flexibility, it remains tight even with slight underground displacements.

Similar rubber joints have also been successfully used for water mains.

ITALY

Definite progress in the production of synthetic rubber at the Pirelli factory in Milan is reported. Recently a series of automobile tires was sent to the military authorities for testing; these tires were not only made of synthetic rubber, but artificial silk was used in their manufacture instead of cotton.

POLAND

"Gentleman," S. A., Lodz, recently announced that some time ago it completed an arrangement with the Seiberling Rubber Co., Akron, O., U. S. A., whereby the Polish concern started a new department, fitted throughout with some of the latest machinery directly under the direction of the Seiberling company, especially for the production, under license, of Seiberling tires and tubes. Production is under the supervision of the American company's resident representative, Henry Walters.

Editor's Book Table

NEW PUBLICATIONS

"Dow Industrial Chemicals and Dyes." The Dow Chemical Co., Midland, Mich. 80 pages. This catalog presents in detail the properties, solubility, specifications, and uses of Dow industrial chemicals. The properties have also been summarized in compact tabular form for convenience. Vapor pressure, titration, specific gravity, boiling and freezing point curves have been included where they would be of value. Chemicals described that find use in the rubber industry include: aniline oil, caustic soda, phenol, sodium sulphide, sulphur chloride, and sulphur monochloride.

"Neville Resins." October, 1938. The Neville Co., Pittsburgh, Pa. 64 pages. This revised edition which incorporates many new developments in thermoplastic resins presents in detail the properties, specifications, and uses of the various types and grades of coumarone-indene, modified coumarone-indene, and cycloparaffin resins offered by the firm for general industrial use. As indicated by the text, these resins find wide application in the rubber industry as fillers, softeners, or tackifiers in such products as: cements, tape, hard rubber, heels and soles, hose, inner tubes and tires, Neoprene compounds, reclaimed rubber, sponge, and tile flooring. Supplementary data contained in the booklet include: solubility and compatibility tables of Neville resins; emulsification directions; testing methods for resins; melting point conversion table; trade name index; Neville solvent specifications; specific gravity and temperature conversion tables.

"The Coming Change in Federal Price Policy." No. 29 in a Series of Booklet-Editorials by Allen W. Rucker in collaboration with N. W. Pickering, President, Farrel-Birmingham Co., Inc., Ansonia, Conn. 20 pages. The authors of this booklet contend that the work of the National Economic Committee, sometimes termed the O'Mahoney "Anti-Monopoly Committee," is probably a prelude to attempted federal control of industrial pricing policies, and, thus, it represents the first move in a basic change of federal policy with respect to all prices. A graph for 1921 to 1938, comparing finished goods prices and farm prices, indicates that prosperous periods occur when industrial and farm prices are balanced or when farm prices are slightly higher. The Administration's first attempt to balance the two price levels, according to the authors, consisted of trying to raise farm prices. Although farm prices were raised temporarily, they could not be held up. As a result of this failure, the authors hold that the Administration, through its O'Mahoney Committee, is evidently going to try the other alternative for reaching a balance: namely, lowering industrial prices to the level of farm prices. The authors conclude with a defense of the present system of pricing by business, contending that in the end private pricing policies will serve the general welfare better than bureaucratic price control.

"News about du Pont Rubber Chemicals." October, 1938. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Two enclosures were received with this news letter: (1) "Neoprene Type G" by N. L. Catton and D. F. Fraser is a 16-page report on the compounding, processing, and properties of Neoprene Type G, a new commercially available Neoprene described elsewhere in this issue; (2) "Contributors to Rubber Compounding Progress. The du Pont Rubber Laboratories" by S. C. Stillwagon is a 16-page reprint of an article which appeared in the September, 1938, issue of INDIA RUBBER WORLD.

"Battery Manual." U. S. Tire Dealers Corp., 1790 Broadway, New York, N. Y. 28 pages. This manual for "U.S." dealers describes and illustrates the various types of U. S. Rubber storage batteries and discusses the following topics: estimation of battery sales volume; advertising, selling, and servicing of batteries; the sale of truck and bus batteries; reading hydrometers and analyzing batteries; charging batteries; ordering and handling stocks. For the benefit and use of the attendant lacking a full knowledge of batteries, the manual contains an account of storage battery principles written in a language free of technical terms.

"The Vanderbilt News." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 24 pages. The November issue of this company journal covers four subjects: Geer oven aging, Selenac, Darvan, and latex adhesives. The section on aging which gives the results of the accelerated aging of four rubber compounds by five different methods indicates that an improved, faster Geer oven test may be obtained by raising the oven temperature from 70° C. to 100° C. Selenac, selenium diethyldithiocarbamate, is introduced in this issue as a fast curing, non-tarnishing vulcanizing agent for use in wire insulating compounds, or compounds for purposes where tarnishing of metals is to be avoided. The section on Darvan compares this dispersing agent with commercial wetting agents and points out their functional differences. The concluding section presents seven latex adhesive formulas for use in the shoe, paper, wood, and textile industries.

"Chemical Industries Buyers' Guidebook Number." *Chemical Industries*, New Haven, Conn. 624 pages. This guidebook, which is Part II of the October, 1938, issue of this monthly journal for the chemical trade, includes data on the following: chemical prices, 1933-1937; list of trade, technical, and scientific organizations in all branches of the chemical field; geographical directory of companies; raw materials buying guide; chemical buying guide; chemical specialties for industrial and agricultural uses and a list of their makers; index of brands, trade names, and synonyms. The book contains information on the source of supply of many rubber compounding materials. It is distributed with subscription to *Chemical Industries*.

"A.S.T.M. Standards on Textile Materials." October, 1938. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. 330 pages. This annual compilation brings up to date the work of Committee D-13 on Textile Materials and covers 52 specifications, test methods, and definitions on a large number of textile materials including tire fabrics. The 1938 volume, in addition to the standards, includes: a psychrometric table for relative humidity; a section comprising 43 photomicrographs of common textile fibers; a yarn number conversion table; a glossary of textile terms; abstracts of ten papers presented at the symposiums on testing methods and on finishing during the past year; and several proposed test methods. For the first time standards are included which cover: colored fabrics (fastness to light); single-ply bleached broadcloth; terry (Turkish) toweling; spun rayon yarns and threads; fiber length of wool and wool yarn mixed with other fibers. Copies of this publication in heavy paper binding at $2 each may be obtained from A.S.T.M. headquarters.

"Hastelloy Alloys. Price List." Haynes Stellite Co., Kokomo, Ind. 8 pages. This folder contains data on sizes, weights, limits, and prices of castings, hot rolled sheets and plates, and bar stock made from the four Hastelloy alloys, designed especially for resistance to corrosive acids.

BOOK REVIEWS

"Columbian Colloidal Carbons." Columbian Carbon Co., 41 E. 42nd St., New York, N. Y. 1938. Cloth, 5¼ by 7½ inches, 193 pages. Index. Illustrated.

This comprehensive book on carbon black contains detailed information on the origin, manufacture, properties, and uses of Columbian colloidal carbons. Its purpose is to disseminate the results of the firm's research as an aid in consumer use of colloidal carbons in industries where their unique properties are valuable.

The scope of the volume is indicated by the following chapter headings: 1. "Colloidal Carbon in Industrial Economy;" 2. "Colloidal Carbon—What Is It?;" 3. "History of Colloidal Carbon in the Arts;" 4. "Manufacture of Colloidal Carbon;" 5. "Dustless Colloidal Carbon;" 6. "Colloidal Properties;" 7. "Electrical Properties;" 8. "Colloidal Carbon in Rubber;" 9. "Colloidal Carbon in Inks and Paints;" 10. "Colloidal Carbon in Other Compositions;" 11. "Columbian Carbon Research;" 12. "Standard Tests of Colloidal Carbon;" 13. "Other Columbian Colloids."

The book is well written, and its format is of high quality. Marginal headings are used throughout the text. Distribution of copies will be limited to consuming companies, consultants, university chemistry departments, and to those industries contemplating the use of colloidal carbons.

"Government Price-Fixing." Jules Backman. Published by Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. 1938. Cloth, 6 by 9 inches, 304 pages. Index. Price $3.

Price-fixing as an important factor in government intervention in the economic system is thoroughly studied in this book. The various mechanisms which have been used, both in this country and abroad, as well as the difficulties and problems to which each one is subject, is discussed. Such price fixing schemes as found in New Deal measures are treated. The author also considers indirect price-fixing through production and marketing controls. The International Rubber Regulation Agreement and the Stevenson Plan are discussed along with other international agreements to control the world supply of commodities. Common points to be considered in such agreements, according to the author, include: control of all sources of supply; effective consumer participation; and provisions for termination of the agreement when conditions regain normality. The author concludes that, although some of the attending difficulties and problems of price-fixing could have been temporarily solved by the institution of more comprehensive schemes, there have been basic forces working against these mechanisms which have usually resulted in their failure. He also contends that the difficulties involved in price-fixing have been out of proportion to the benefits derived.

"Second Report on Viscosity and Plasticity." Prepared by the Committee for the Study of Viscosity of the Academy of Sciences at Amsterdam. Nordemann Publishing Co., Inc., 215 Fourth Ave., New York, N. Y. 1938. Cloth, 7 by 10¼ inches, 287 pages. Subject and author index. Price $7.50.

The second report on this subject continues and extends the surveys on various aspects of viscous and plastic deformation which were instituted in the first report published in 1935. The book is divided into six chapters with the following headings and authors: I. "Introductory Remarks on Recent Investigations Concerning the Structure of Liquids," by J. M. Burgers; II. "Viscosity of Liquids in Connection with Their Chemical and Physical Constitution," F. M. Jaeger; III. "On the Motion of Small Particles of Elongated Form, Suspended in a Viscous Liquid," J. M. Burgers; IV. "The Yield Value," R. Houwink; V. "Recent Plastometers," C. J. Van Nieuwenburg; VI. "Technical Capillary Viscometers," R. N. J. Saal. The reports on which the chapters are based have been subjected to discussion by the full committee. Thus, while the main part of each chapter is the work of the author, many details have been the result of an exchange of opinions.

As indicated by the chapter headings, this volume is devoted chiefly to some of the more basic theoretical aspects relating to this field and reports recent progress in various phases of this work. As the subject matter has an important bearing on the physics of rubber, technologists in the rubber field should find much of interest and value in this volume. Several references to rubber are made in the text. The preface points out that new members added to the committee include: Dr. R. Houwink and Dr. A. van Rossem who are to work on problems relating to plastic masses (resins, rubber, and artificial products).

Some Notes on the Use of Covers on Coastal Soils. W. A. Stanton, *India Rubber J.*, Oct. 29, 1938, p. 11.

Establishment of Creeping Leguminous Covers under Mature Rubber. *India Rubber J.*, Oct. 29, 1938, pp. 12-13.

Soil Covers on Rubber Plantations. G. W. Chapman, *India Rubber J.*, Nov. 5, 1938, pp. 5-6.

The Manuring of Leguminous Cover-Crops. C. H. Tilley, *India Rubber J.*, Nov. 5, 1938, pp. 6-8.

Rubber for Cattle Byres. *India Rubber J.*, Nov. 5, 1938, p. 12.

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The Early History of Rubber in Malaya. *Bull. Rubber Growers' Assocn.*, Oct., 1938, pp. 421-26.

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Observations on the Viscosity of Rubber Solutions. E. Guth, *Rubber Chem. Tech.*, Oct., 1938, pp. 676-79.

Contributions to the Analysis of Rubber. III. Determination of Copper in Raw Rubber, in Mixtures, and in Fillers. P. Dekker, *Rubber Chem. Tech.*, Oct., 1938, pp. 706-15.

The Economics of a Synthetic Material. New Uses of Neoprene in Home and Plant. *Chem. Ind.*, Nov., 1938, pp. 481-84.

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The Large Molecule. *Rubber Age (London)*, Nov., 1938, pp. 258-59.

The Softening of Rubber. I. F. H. Cotton, *Rubber Age (London)*, Nov., 1938, pp. 260-62, 274.

The Story of Latex. *Rubber Age (London)*, Nov., 1938, pp. 263-66.

Latex in Industry. Latex and Textiles. II. H. J. Stern and J. W. Malden, *Rubber Age (London)*, Nov., 1938, pp. 269-72.

Curing Temperatures. H. A. Freeman, *Tire Rebuilders News*, Oct., 1938, pp. 24, 32.

Electrodeposition of Rubber. Current-Time Relations. *Ind. Eng. Chem.*, Nov., 1938, pp. 1282-84.

Chemical Structure of Vulcanized Rubber. J. R. Brown and E. A. Hauser, *Ind. Eng. Chem.*, Nov., 1938, pp. 1291-96.

Suggestions on Tire Retreading. *India Rubber J.*, Oct. 15, 1938, p. 7.

Choice of Hevea Planting Material. G. S. Reis, *India Rubber J.*, Oct. 15, 1938, pp. 9-10.

Compounding Ingredients for Rubber Latex. C. F. Flint, *India Rubber J.*, Oct. 22, 1938, pp. 4-5.

Preservation of Latex. D. Spence, *Rubber Age (N. Y.)*, Nov., 1938, pp. 79-81.

The Social Aspects of International Rubber Regulation. E. G. Holt, *Rubber Age (N. Y.)*, Nov., 1938, pp. 84-86.

Charles Goodyear. P. W. Barker, *Rubber Age (N. Y.)*, Nov., 1938, pp. 88-90. (To be continued.)

(*Continued on page 84*)

Patents and Trade Marks

MACHINERY

United States

2,133,438. **Tire Tread Slitter.** E. Eger, Grosse Pointe Park, Mich., assignor to United States Rubber Products, Inc., New York, N. Y.

2,133,788. **Heel Mold.** L. M. Oakley, assignor to Essex Rubber Co., both of Trenton, N. J.

2,133,821. **Tread Mechanism.** G. D. Kratz, Scarsdale, assignor, by mesne assignments, to Filatex Corp., New York, both in N. Y.

2,134,172. **Rubber Hydrochloride Film Apparatus.** W. C. Calvert, Chicago, Ill., assignor to Wingfoot Corp., Wilmington, Del.

2,134,364. **Curing Apparatus.** B. S. Glougie, assignor to Baldwin Rubber Co., both of Pontiac, Mich.

2,134,723. **Rubber Trim Attaching Press.** J. P. Marshall, Coventry, R. I., assignor, by mesne assignments, to Goodyear Footwear Corp., a corporation of Del.

2,134,754. **Mat Forming Apparatus.** H. M. Flint and C. Schermerhorn, assignors to Gates Rubber Co., all of Denver, Colo.

2,135,385. **Device to Apply Strips to Sheet Material.** A. E. Collins, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,135,601. **Coating Apparatus.** R. R. Putt, Portage Lake, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,135,681. **Tube Leak Tester.** H. Smith, Sutton Coldfield, and G. C. Brentnall, assignors to Dunlop Rubber Co., Ltd., both of Birmingham, both in England.

2,136,026. **Core Coverer.** J. P. Shorrock, assignor to B. F. Perkins & Son, Inc., both of Holyoke, Mass.

2,136,743. **Machine to Make Elastic Helical Conducting Cords.** H. H. Hollenweger, Zurich, assignor to Condelex, S. A., Zug, both in Switzerland.

Dominion of Canada

377,289. **Footwear Roller.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. R. Polleys, New Haven, Conn., U. S. A.

377,552. **Strip Cutter.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. F. Wikle, Ann Arbor, and C. S. Lennox, Detroit, coinventors, both in Mich., U. S. A.

377,555. **Mold Article Loosening Apparatus.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of R. D. Hulslander, Akron, O., U. S. A.

Germany

666,696. **Machine to Stamp and Finish Cores for Rubber Heels, Etc.** United Shoe Machinery Corp., Boston, Mass. Represented by A. Bohr and H. Fincke, both of Berlin.

666,806. **Vulcanizer.** L. Herbert, Frankfurt a.M.

667,101. **Vulcanizing Press Plate.** H. Hoenig and Schloemann A.G., both of Dusseldorf.

United Kingdom

488,824. **Wrapping Machine.** L. L. Salfisberg.

489,676. **Rubber Sheeting Machine.** J. Cairns.

PROCESS

United States

2,133,346. **Coating Rubber Articles.** A. L. Diller and F. F. Olson, both of Belmont, assignors to Hood Rubber Co., Inc., Watertown, both in Mass.

2,133,693. **Coagulating Rubber upon Fibers.** H. W. Greider, Wyoming, and M. F. Smith, Cincinnati, both in O., assignors to P. Carey Mfg. Co., a corporation of O.

2,133,833. **Rubber Articles.** R. W. Sampson, New York, N. Y., assignor to Sampson Rubber Products Corp., Detroit, Mich.

2,133,914. **Advertising Medium.** L. J. Burke, assignor to Poster Products, Inc., both of Chicago, Ill.

2,134,124. **Hard Rubber Article.** W. Hiemann, assignor to American Hard Rubber Co., both of New York, N. Y.

2,134,591. **Inner Tubes.** H. Wagner, Akron, O., assignor of 8% to J. P. Murphy, Jr., Brooklyn, and 2% to S. E. Ryan, Forest Hills, both in N. Y.

2,134,671. **Plastic Packing.** F. E. Payne, Glencoe, assignor to Crane Packing Co., Chicago, both in Ill.

2,134,831. **Bunion Pad.** C. L. Moon, Marshalltown, Iowa.

2,135,151. **Rubber Coating.** M. O. Schur, assignor to Brown Co., both of Berlin, N. H.

2,135,395. **Multicolored Rubber Mixings.** A. Holzapfel, Wiesbaden-Eigenheim, assignor to E. Frölich, Osterode/Harz, both in Germany.

2,135,570. **Valve Stems.** T. J. Ellis, Akron, assignor, by mesne assignments, to Dill Mfg. Co., Cleveland, both in O.

2,135,886. **Tire Wire.** F. C. Elder, Cleveland Heights, O., assignor to American Steel & Wire Co. of New Jersey, a corporation of N. J.

2,136,092. **Elastic Leather.** S. Troy, New York, N. Y.

2,136,099. **Salvaging Constituents of Tires.** A. B. Buxbaum, Akron, O.

2,136,826. **Molded Articles.** M. O. Schur, assignor to Brown Co., both of Berlin, N. H.

Dominion of Canada

377,142. **Shoe Fabric.** Cambridge Rubber, Ltd., St. Remi de Napierville, P. Q., assignee of C. E. Reynolds, Watertown, Mass., U. S. A.

377,177. **Polymerization Product.** I. G. Farbenindustrie A.G., Frankfurt a.M., assignee of A. Weihe, Bad Soden/-Taunus, both in Germany.

377,194. **Abrasive Wheel.** Norton Co., Worcester, assignee of M. B. Lane, Holden, both in Mass., U. S. A.

377,287. **Printing Blanket.** Dewey & Almy Chemical Co. of Canada, Ltd., Farnham, P. Q., assignee of P. R. Hodges, Taunton, Mass., U. S. A.

377,468. **Bandage.** J. A. Hinkamp and H. R. Brasel, co-inventors, both of Chicago, Ill., U. S. A.

United Kingdom

487,864. **Tire Cover Patch.** T. W. Mullen.

489,103. **Preserving Rubber.** K. Stengel and T. Kauders.

489,412. **Napkin.** International Latex Processes, Ltd.

489,616. **Rubber Thread.** J. H. Rooney and P. R. Hawtin.

489,721. **Elastic Packing.** P. Lechler, (trading as P. Lechler).

Germany

665,267. **Rubber Linings.** Mitteldeutsche Stahlwerke A.G., Riesa.

667,100. **V-Belts.** Getefo Gesellschaft fur technischen Fortschritt m.b.H., Berlin.

CHEMICAL

United States

2,133,297. **Antioxidants.** P. C. Jones, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,133,690. **Rubber.** A. K. Epstein and B. R. Harris, both of Chicago, Ill.; said Epstein assignor to said Harris.

2,133,779. **Antioxidant.** A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,133,782. **Accelerator.** J. G. Lichty, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,134,006. **Resin-Rubber Adhesive.** H. C. Roller, Glendale, Calif.

2,134,139. **Rubber Preservative.** G. D. Martin, Nitro, W. Va., assignor, by mesne assignments, to Monsanto Chemical Co., Wilmington, Del.

2,134,335. **Polymer of Vegetable Oil.** H. G. Kittredge, assignor to Kay & Ess Chemical Corp., Dayton, O.

2,134,957. **Accelerators.** L. B. Sebrell, Silver Lake, O., assignor to Wingfoot Corp., Wilmington, Del.

2,136,270. **Chlorinated Rubber Composition.** N. Bennett, Widnes, England, assignor to Imperial Chemical Industries Ltd., a corporation of Great Britain.

2,136,332. **Vulcanizing Agent.** A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,136,335. **Antioxidant.** H. I. Cramer, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.

2,136,342. **Pigmented Rubber Hydrohalides.** J. B. Holden, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,136,373. **Plasticizer.** W. F. Busse, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,136,499. **Film-Forming Composition.** W. E. Gloor, South River, N. J., assignor to Hercules Powder Co., Wilmington, Del.

2,136,544. **Composite Sheet of Rubber Hydrochloride and Casein.** E. Gebauer-Fuelnegg, deceased, by M. Gebauer-Fuelnegg, administratrix, both of Evanston, Ill., and E. W. Moffett, Pittsburgh, Pa., and E. M. Kratz, Chicago, Ill., assignors to Marbon Corp., Gary, Ind.

2,136,771. **Compounding Ingredients.** C. H. Campbell, Kent, O.

2,136,949. **Accelerator.** L. Orthner, Leverkusen-on-the-Rhine, and E. Zaucker, Cologne-Mulheim-on-the-Rhine, assignors to I. G. Farbenindustrie A.G., Frankfurt a.M., all in Germany.

2,137,084. **Protective Coating.** C. L. Hauthaway, Newton, Mass.

2,137,147. **Corrosion Preventive or Lubricant.** E. R. Styles, assignor to Silvertown Lubricants, Ltd., both of London, England.

Dominion of Canada

377,176. **Homogenized Rubber-Like Compositions from Polyvinylhalides.** I. G. Farbenindustrie A.G., assignee of L. Orthner, both of Frankfurt a.M., and W. Heuer, Hofheim, co-inventors, both in Germany.

377,283. **Chlorinated Synthetic Rubber.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. H. Carothers, Wilmington, Del.

377,427. **Rubber Hydrohalide.** Marbon Corp., formerly Marbo Products Corp., assignee of H. A. Winkelmann, both of Chicago, Ill., U. S. A.

377,551. **Accelerator.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. F. Tuley, Naugatuck, Conn., U. S. A.

377,594. **Vulcanizing Agents.** Wingfoot Corp., Wilmington, Del., assignee of J. G. Lichty, Stow, O., both in the U. S. A.

377,595. **Vulcanizing Agents.** Wingfoot Corp., Wilmington, Del., assignee of G. W. Watt, Akron, O., both in the U. S. A.

United Kingdom

488,033. **Abrasive Binder.** Carborundum Co.

489,301. **Cable Sheath Composition.** Callender's Cable & Construction Co., Ltd., L. G. Brazier, and G. M. Hamilton.

489,356. **Latex Coating.** International Cellucotton Products Co.

489,458. **Dye.** Compagnie Nationale De Matieres Colorantes Et Manufactures De Produits Chimiques Du Nord Reunies Etablissements Kuhlmann.

489,506. **Insulating Compositions.** British Thomson-Houston Co., Ltd.

489,572. **Protective Coating for Cables.** Standard Telephones & Cables, Ltd. (Standard Telefonog Kabelfabrik Aktiesselskab).

489,764. **Bonding Agent for Synthetic Rubber.** H. Heine, (trading as Heine Mobelfabrik Propellerwerk, H.).

489,847. **Latex-Asphalt Composition.** G. P. Davis.

489,848. **Latex-Cement Compositions.** G. P. Davis.

489,954. **Chlorinated Rubber.** Raolin Corp.

489,977. **Chlorinated Rubber Varnish.** Raolin Corp.

GENERAL

United States

20,884. (Reissue). **Compensating Wheeled Structure.** W. F. Herold, assignor to Bassick Co., both of Bridgeport, Conn.

2,133,278. **Package Assembler.** R. R. Brogden, Orlando, Fla., assignor to Bank of Manhattan Co., New York, N. Y.

2,133,304. **Rotary Shaft Packing.** F. Y. Nichols, Chicago, Ill.

2,133,382. **Cable.** L. Emanueli, assignor to Società Italiana Pirelli, both of Milan, Italy.

2,133,399. **Cable.** M. Puritz, London, England, assignor to Società Italiana Pirelli, Milan, Italy.

2,133,411. **Nurser.** L. A. Zohe, Syracuse, N. Y.

2,133,602. **Striker Plate.** R. J. Waterbury, Birmingham, assignor to General Motors Corp., Detroit, both in Mich.

2,133,617. **Fountain Pen.** B. W. Hanle, Elizabeth, N. J., assignor to Eagle Pencil Co., New York, N. Y.

1,133,695. **Golf Club Grip.** E. E. Hall, Chicago, Ill.

2,133,699. **Inhaler.** J. A. Heidbrink, Minneapolis, Minn., assignor to Ohio Chemical & Mfg. Co., Cleveland, O.

2,133,771. **Composite Article.** J. T. McLane, McKeesport, Pa., assignor to Sun Rubber Co., Barberton, O.

2,133,840. **Knitted Fabric.** C. R. Anderson, assignor, by mesne assignments, to Munsingwear, Inc., both of Minneapolis, Minn.

2,133,863. **Cable.** H. G. Knoderer, Fairfield, Conn., assignor to General Electric Co., a corporation of N. Y.

2,134,063. **Toy.** L. Turchányi, Sashalom, assignor to Magyar Ruggyantaarugyar, Reszvenytarsasag, Budapest, both in Hungary.

2,134,173. **Footwear.** E. Calvin, Akron, O.

2,134,290 and 2,134,291. **Syringe.** H. H. Schulz, London, England.

2,134,292. **Curtain Fixture.** J. Schunk, assignor to National Lock Washer Co., both of Newark, N. J.

2,134,302. **Gasket.** F. L. Haushalter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,134,477. **Weather Guard.** H. O. Hendriksen, Brooklyn, N. Y.

2,134,484. **Chenille Yarn.** M. Kline, Chicago, Ill.

2,134,630. **Fabric.** J. F. White, London, England, assignor, by mesne assignments, to Martin-White of America, Inc., New York, N. Y.

2,134,634. **Ball.** H. Goldsmith, assignor to P. Goldsmith Sons Co., both of Cincinnati, O.

2,134,646. **Disease Treating Apparatus.** C. Sauzedde, Detroit, Mich.

2,134,704. **Photostating Apparatus.** V. H. Cornell, New York, N. Y.

2,134,746. **Bottle Holder.** P. E. Allen, Niles Center, Ill.

2,134,819. **Powered Apparatus Base.** J. L. Hamilton, Richmond Heights, assignor to Century Electric Co., St. Louis, both in Mo.

2,134,848. **Tractor Plow.** L. D. H. Anderson, Wellesley, Mass.

2,134,908. **Package Structure.** L. G. Copeman, assignor to Copeman Laboratories Co., both of Flint, Mich.

2,134,925. **Sanitary Protector.** H. E. Nichols, Bridgeport, Conn., and L. Rabiner, New York, N. Y.

2,134,946. **Radio Shielding Means.** R. T. Hurley, Dobbs Ferry, N. Y., assignor to Bendix Aviation Corp., South Bend, Ind.

2,134,950. **Carbon Black.** H. H. Offutt, Winchester, assignor to Godfrey L. Cabot, Inc., Boston, both in Mass.

2,134,977. **Garment Cover.** J. R. Lankenau, Brookline, Mass.

2,134,985. **Pressure and Sealing Device.** W. G. Parrott, Stamford, Conn.

2,135,095. **Lifesaver.** M. A. Antognazzi, Rosario de Santa Fe, Argentina.

2,135,210. **Golf Ball.** J. R. Farrar, Cleveland, O.

2,135,303. **Tire Pressure Indicator.** E. Greene, Montclair, N. J.

2,135,307. **Wheel.** E. O. Keator, Dayton, O.

2,135,335. **Heel.** W. P. Harty, assignor to O'Sullivan Rubber Co., Inc., both of Winchester, Va.

2,135,386. **Container Closure.** L. T. Crabbe, assignor to Phoenix Metal Cap Co., Inc., both of Chicago, Ill.

2,135,492. **Electrolytic Device.** J. B. Brennan, Fort Wayne, Ind.

2,135,569. **Valve Stem.** T. J. Ellis, Akron, assignor, by mesne assignments, to Dill Mfg. Co., Cleveland, both in O.

2,135,634. **Shaft Coupling.** J. K. Byrom, assignor to Renold & Coventry Chain Co., Ltd., both of Manchester, England.

2,135,655. **Corset.** E. Bertrams, assignor to Kabo Corset Co., both of Chicago, Ill.

2,135,657. **Seat Construction.** F. O. Church, assignor to Dunlop Tire & Rubber Corp., both of Buffalo, N. Y.

2,135,688. **Gun Firing Device.** J. Wright, Coventry, and H. Trevaskis, Sutton Coldfield, assignors to Dunlop Rubber Co., Ltd., London, all in England.

2,135,802. **Tire Handling Device.** T. Dinkins, Ridgefield Park, N. J.

2,135,853. **Boxing Glove.** J. Slizus and M. Kairis, both of Seattle, Wash.

2,135,869. **Tire Valve.** A. Engel, Brooklyn, N. Y.

2,135,901. **Elastic Fabric.** H. K. Lea, assignor to Kenlea Mfg. Corp., both of Johnstown, N. Y.

2,135,931. **Corselet.** D. W. Adair, New York, N. Y.

2,135,940. **Puncture Sealing Compound.** H. Heil, Munich, assignor to Deutsche Kurtin-Oel-Fabriken, Neubiberg, Bavaria, both in Germany.

2,135,990. **Tire Pressure Gage.** O. T. Nelson, Cleveland, O.

2,136,038. **Tire Deflation Indicator.** P. M. Bourdon, Paris, assignor to Michelin & Cie, Clermont-Ferrand, both in France.

2,136,043. **Heating Device for Therapeutical Purposes.** W. W. DeLaney, assignor to Seamless Rubber Co., Inc., both of New Haven, Conn.

2,136,050. **Spray Head.** O. W. Holden, assignor to Knickerbocker Rubber Co., both of Chicago, Ill.

2,136,093. **Eraser.** G. F. Voight, Oakland, Calif.

2,136,193. **Plug.** H. C. Karst, Hanover, Pa., assignor to Belden Mfg. Co., Chicago, Ill.

2,136,230. **Hose.** M. Bermand and W. Brockner, assignors to Hewitt Rubber Corp., all of Buffalo, N. Y.

2,136,250. **Foundation Garment.** R. F. Peck, assignor to Winget Kickernick Co., both of Minneapolis, Minn.

2,136,310. **Signal.** A. M. Nielsen, Buffalo, N. Y.

2,136,371. **Fountain Pen.** L. A. Brooke, Washington, D. C.
2,136,390. **Liquid Tank.** C. P. McHugh, assignor to Raybestos-Manhattan, Inc., both of Passaic, N. J.
2,136,440. **Trailer Hitch.** G. H. Hufferd, Detroit, Mich., assignor to Thompson Products, Inc., Cleveland, O.
2,136,498. **Plug.** H. D. Geyer, Dayton, O., assignor to General Motors Corp., Detroit, Mich.
2,136,514. **Nipple and Cap.** J. Little, Warwick, R. I., assignor to Davol Rubber Co., a corporation of R. I.
2,136,520. **Bladder Valve.** I. D. Perry, Chicago, Ill., assignor to E. G. Clements, Washington, D. C.
2,136,567. **Tire.** C. W. Smith, Detroit, Mich., assignor to United States Rubber Products, Inc., New York, N. Y.
2,136,568. **Electrolytic Device Vent.** G. K. Sziklai, New York, assignor to Electro-Mechanical Research, Inc., Brooklyn, both in N. Y.
2,136,572. **Ozonizer.** H. A. Winkelmann and A. B. Fridaker, both of Chicago, Ill., assignors to Marbon Corp., a corporation of Del.
2,136,585. **Brake Block.** D. S. Bruce, Somerville, N. J., assignor to Johns-Manville Corp., New York, N. Y.
2,136,603. **Hair Net.** H. Aull, assignor to Friedberger-Aaron Mfg. Co., both of Philadelphia, Pa.
2,136,720. **Telephonic Apparatus.** J. C. White, Boston, Mass.; A. G. White, Boston, Mass., executrix of said J. C. White, deceased.
2,136,733. **Rail Car Truck.** W. B. Dean, Narberth, assignor to E. G. Budd Mfg. Co., Philadelphia, both in Pa.
2,136,734. **Gasket.** H. B. Denman, Birmingham, assignor to Detroit Gasket & Mfg. Co., Detroit, both in Mich.
2,136,742. **Garter, Girdle, Brassiere, Etc.** H. M. Herbener, Thomasville, Ga.
2,136,783. **Curler.** J. Coggans and R. Kelso, both of Glasgow, Scotland.
2,136,796. **Belt.** L. Krantz, New York, N. Y.
2,136,848. **Detachable Connecter.** W. O. Hassler, Kent, O.
2,136,889. **Garment.** H. B. Richards, Lake Bluff, assignor, by mesne assignments, to Richards, Boggs & King, Inc., Chicago, both in Ill.
2,136,929. **Tire Inflating and Closure Means.** T. E. Adams, Angola, N. Y.
2,136,967. **Stylograph.** J. Donner and F. Jansco, both of Budapest, Hungary.
2,136,980. **Heel Support.** J. Pim, Johannesburg, South Africa.
2,137,130. **Suspensory.** J. J. Cartledge, Guelph, Ont., Canada.
2,137,182. **Foundation Garment.** P. H. Robbins, assignor to Poirette Corsets, Inc., both of New York, N. Y.

Dominion of Canada

377,203. **Corset.** Strouse, Adler Co., New Haven, Conn., assignee of M. Laguzzi, Long Island City, N. Y., both in the U. S. A.
377,207. **Typewriter. Underwood Elliott Fisher Co.,** New York, N. Y., assignee of W. F. Helmond, West Hartford, Conn., both in the U. S. A.
377,228. **Floor Supporter.** J. F. Bolton and A. Birch, co-inventors, both of Bolton, England.
377,293. **Tire.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of F. G. W. King and L. J. Lambourn, co-inventors, both of Birmingham, England.
377,304. **Track Grinding Brick.** Norton Co., assignee of R. G. Van Keuren, both of Worcester, Mass., U. S. A.
377,336. **Dress Shield.** S. Bendersky, South Orange, N. J., U. S. A.
377,337. **Gauntlet.** D. K. Black, Montreal, P. Q.
377,379. **Conduit.** American Steel & Wire Co., Cleveland, O., assignee of A. E. Brickman and G. A. Gleason, co-inventors, both of Worcester, Mass., both in the U. S. A.
377,388. **Electrolytic Device Protective Means.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of F. M. Clark and R. A. Ruscetta, co-inventors, both of Pittsfield, Mass., U. S. A.
377,460. **Roller Skate Wheel.** H. T. Auerbach, assignee of E. A. Grange and E. J. Schmidt, co-inventors, all of Chicago, Ill., U. S. A.
377,477. **Dental Dam.** J. M. Craigo, Hartford, Conn., U. S. A.
377,479. **Atomizer.** H. E. Curry, Seattle, Wash. U. S. A.
377,553. **Laundry Bag.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. M. Coe, Lancaster, Pa., and N. H. Curtiss, Clifton, N. J.

United Kingdom

487,468. **Wheel Suspension.** C. A. Voigt.
487,613. **Bearing.** Manufacture Alsacienne De Broches Anciennement Les Fils D'E. Latscha, Soc. A.R.L.
487,682. **Mounting Motor.** M. Goldschmidt.
487,840. **Plate Heat-Exchanger.** W. W. Triggs, (E. Ahlborn A.G.).
487,881. **Lamp.** R. G. Parsons.
488,069. **Tire Deflation Indicator.** D. J. Hogg.
488,180. **Wheels.** Dunlop Rubber Co., Ltd.
488,232. **Float Valve.** W. King.
488,255. **Shoe Sock.** Smith, Stone & Knight, Ltd., and T. P. Smith.
488,271. **Valves.** P. A. I. Cuvelier.
488,272. **Catamenial Appliance.** E. E. Pettersen.
488,283. **Trawling Gear.** H. D. Holland.
488,326. **Toothbrush.** R. Lowenstein.
488,332. **Noise Excluder.** T. G. Carroll.
488,349. **Transformer.** British Thomson-Houston Co., Ltd.
488,353. **Spring Suspension.** Bayerische Moteren Werke A.G.
488,355. **Pipe.** Soc. A.R.L. Etablissements H. B.
488,372. **Paper File.** W. Liemann.
488,379. **Seat.** L. Assalit.
488,382. **Brake Friction Surface.** P. Smalzi and D. T. Tosoni.
488,384. **Pouch.** H. Shoerats.
488,395. **Hair Curler.** J. Coggans and R. Kelso.
488,432. **Cable.** Okonite Co.
488,435. **Expanding Box.** H. Bellau.
488,452. **Vacuum Cleaner.** F. Eisenlohr.
488,477. **Screw Propeller.** Soc. D'Inventions Aeronautiques Et Mecaniques, S.I.A.M.
488,489. **Hydraulic Transmission of Power.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., F. J. Tarris, and D. Webb.
488,496. **Tire Tread.** Firestone Tyre & Rubber Co., Ltd., (Firestone Tire & Rubber Co.).
488,498. **Signalling System.** H. W. Barton.
488,504. **Stretcher.** N. A. Swarbrick.
488,540. **Toothbrush Handle.** C. H. Seifert.
488,541. **Fountain Pen.** R. Namiki.
488,546. **Hydraulic Transmission of Power.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., F. J. Tarris, and D. Webb.
488,549. **Tool.** E. D. Wynn.
488,552. **Cutting Die.** G. E. and H. Gay, (trading as Gay Bros.), and E. E. Tournier.
488,569. **Hydraulic Press.** Prosthetic Products, Ltd.
488,572. **Fountain Pen.** E. K. Werner.
488,606. **Knitted Fabric.** P. Schonfeld.
488,663. **Liquid Dispenser.** G. Binon and P. & J. Arnold, Ltd.
488,679. **Filter.** L. A. Fitzgerald.
488,721. **Frame.** G. Dalgity, and O. Cooney.
488,789. **Vehicle Frame.** Zavody Tatra Akciova Spolecnost Pro Stavbu Automobilu A Zeleznicnich Vozu.
488,811. **Suspension Device.** C. A. Voigt.
488,820. **Aircraft Wing Covering.** J. R. Ridear and A. M. Ducret.
488,826. **Heating Pad.** J. Bartrik.
488,811. **Resilient Mounting.** C. A. Voigt.
488,840. **Trouser Hanger.** E. Hoffmann.
488,888. **Vehicle Spring Suspension.** Getefo Ges. Fur Technischen Fortschritt.
488,915. **Sponge Rubber.** Expanded Rubber Co., Ltd.
488,940. **Vacuum Cleaner Nozzle.** Electrolux, Ltd., (Aktiebolaget Elektrolux).
488,943. **Pipe Joint.** F. Moulton.
488,953. **Pressure Relieving Device for Fluids.** H. P. Dean, J. L. Thomson, and Imperial Chemical Industries, Ltd.
488,955. **Conveyer Belt.** W. Banham.
488,999. **Paper Making Machine.** O. Rolls.
489,009. **Coupling.** Soc. D'Inventions Aeronautiques Et Mecaniques S.I.A.M.
489,042. **Fountain Pen.** G. Sweetser.
489,044. **Joint.** C. A. Voigt.
489,116. **Light Excluding Blind.** U. L. O. Lisle.
489,240. **Driving Device.** W. Bradley.
489,242. **Vacuum Cleaner.** Naamlooze Vennootschap Radiofabriek & Ingenieursbureau Voorheen Van Der Heem & Bloemsma.
489,245. **Fabric.** H. Atwater.
489,253. **Traffic Signal.** R. Bosch A.G.
489,279. **Self-Combustible Charges for Generating Gases under Pressure.** T. M. Holm, W. McEwen, and Imperial Chemical Industries, Ltd.
489,281. **Tire Tread.** G. W. Beldam.
489,288. **Piston.** Bendix-Westinghouse Automotive Air Brake Co.
489,305. **Wheel Tires.** R. Stahl.
489,308. **Grinding Machine.** Norton Co.
489,352. **Windscreen Wiper.** U. Galli.
489,359. **Tire.** H. Schafer.
489,368. **Rubber Spring.** M. Goldschmidt.
489,369 and 489,371. **Resilient Mounting.** E. H. Piron.
489,382. **Battery Lamp.** General Electric Co., Ltd., and S. W. Richards.
489,503. **Toy Motor Car Track.** Britains, Ltd., and G. E. Smallwood.
489,514. **Speedometer.** G. H. Dowty.

489,548. **Loud Speaker.** G. C. Wheeler, H. J. Houlgate, and G. R. Fountain, Ltd.
489,596. **Wheel Tire.** Soc. Anon. Des Automobiles Peugeot.
489,618. **Vibration Damper.** L. Bechereau, and R. Carrouee.
489,619. **Jaw Crusher.** G. H. Schieferstein.
489,643. **Valve Component.** British Thomson-Houston Co., Ltd.
489,661. **Grinding Apparatus.** Pilkington Bros., Ltd., and F. B. Waldron.
489,670. **Road Surface.** L. Razini.
489,673. **Hand Loom.** A. H. and G. H. Raba.
489,730. **Comb.** H. Freeman.
489,773. **Piston.** Non-Drip Measure Co., Ltd., F. W. and A. G. Berwick.
489,798. **Coils.** Allgemeine Elektricitats-Ges.
489,812. **Roller Skate Wheel.** H. T. Auerbach.
489,813. **Resilient Mounting.** K. and H. Schroter.
489,824. **Carboy Stopper.** W. S. Freeman.
489,825. **Wheel.** Soc. Anon. Des Pneumatiques Dunlop.
489,841. **Pajama Leg Strap.** G. T Booth.
489,868. **Contractor Panel.** S. S. Guy, R. Dean-Averns, and J. E. Reece.
489,874. **Attachment Material for Wire Ropes and Cables.** R. Rhonisch.
489,903. **Compound Fabric.** Ludlum Steel Co.
489,945. **Wireless Valve Container.** M-O Valve Co., Ltd., H. G. Coker, and J. F. Turner.
489,948. **Printing Plate.** C. E. Boutwell.
489,975. **Catamenial Appliance.** Johnson & Johnson (Great Britain), Ltd.
489,990. **Hair Curler.** N. L. Solomon.

Germany

665,307. **Conveyer Belt.** Continental Gummi-Werke A.G., Hannover.
665,314. **Sponge Rubber Product.** Dunlop Rubber Co., Ltd., London, England, and The Anode Rubber Co., Ltd., St. Peter's Port, Channel Islands. Represented by C. Wiegand, Berlin.
665,366. **Brushes. Mats, Etc., from Strips of Old Rubber.** Magyar Nemzetl Szovetseg, Budapest, Hungary. Represented by A. Kuhn, Berlin.
665,841. **Shoe.** Romika Svuhfabrik Gusterath, G.m.b.H., Gusterath.
666,034. **Toy.** L. Aigner, Munich.
666,653. **Contact Plug.** Allgemeine Elektricitats-Gesellschaft, Berlin. werke Becker A.G., Heidenheim, Brenz.
666,690. **Mask.** Clora Atemschutzgerate Schleich & Co. and F. Schleich, both of Schwabisch Gmund.
666,695. **Rubber Cover for Shoes.** S. M. Griswold and B. B. Chemical Co., both of Boston, Mass., U. S. A. Represented by A. Bohr and H. Fincke, both of Berlin.
667,173. **Weatherproof Clothing.** A. Kissner, and Klepperwerke G.m.b.H., both of Rosenheim.

TRADE MARKS

United States

361,409. Rectangle containing the word: **"Luxite"** and circle containing representation of a bird. Corsets and girdles. Holeproof Hosiery Co., Milwaukee, Wis.
361,470. **Wyndster.** Coats. United States Rubber Products, Inc., New York, N. Y.
361,543. **Lee of Conshohocken.** Tires, inner tubes, repair kits, footwear, etc. Lee Rubber & Tire Corp., Conshohocken, Pa.
361,544. **S'porters.** Abdominal support and jock strap. I. B. Kleinert Rubber Co., New York, N. Y.
361 565. **Unetex.** Woven elastic fabrics. United Elastic Corp., Easthampton, Mass.
361,568. **Barrett.** Pitch, tar, bituminous materials for compounding rubber, and asphalt for the manufacture of rubber goods. Barrett Co., New York, N. Y.
361,601. Representation of two golf balls and the word: **"Pro-Click."** Golf balls. I. D. Malbrough, Jr., doing business as Great Lakes Golf Ball Co., Chicago, Ill.
361,646. **Respovac.** Therapeutic apparatus. General Tire & Rubber Co., Akron, O.
361,648. Circle containing representation of a car and the word: **"Ak-Ro-No."** Preparation for cleaning and restoring luster to rubber and rubber products. Ak-Ro-No Auto Products Co., Vandalia, Ill.
361,657. **Impervex.** Rubber insulation. Crescent Insulated Wire & Cable Co., Trenton, N. J.
361,678. **Master.** Golf balls. MacGregor Co., Dayton, O.
361,685. **Safti-Ride.** Golf balls. Federal Rubber Co., Chicago, Ill.
361,686. **Safti-Flight.** Golf balls. Fisk Rubber Corp., Chicopee Falls, Mass.
361,689. **Acme.** Golf balls. Arkansas Fuel Oil Co., Shreveport, La.
361,690. **Acme.** Tires, tubes, and accessories. Arkansas Fuel Oil Co., Shreveport, La.
361,710. **Silver Arrow.** Baseballs. General Tire & Rubber Co., Akron, O., doing business as Wabash Industries, Wabash, Ind.
361,711. **Tissu-Weight.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
361,733. Representation of a crest with a streamer containing the words: **"Dual Tone."** Radio receiving sets. General Tire & Rubber Co., Akron, O.
361,752. **Speedway.** Automobile robes. Goodyear Tire & Rubber Co., Akron, O.
361,783. **Super Thermax.** Wires and cables. General Cable Corp., New York, N. Y.
361,859. Representation of a double circle containing the letters: **"YKL."** Storage batteries. Goodyear Tire & Rubber Co., Akron, O.
361,869. **The Greatest Name In Golf.** Golf balls and clubs. MacGregor Co., Dayton, O.
361,884. Diamond containing representation of three balloons and the words: **"Oak-Hytex-Oak-Toy Balloons."** Balloons. Oak Rubber Co., Ravenna, O.
361,892. **Oso-Ez.** Exercisers. Rubbercraft Corp. of Calif., Ltd., Los Angeles, Calif.
361,899. **Youthlyne.** Chin reducers. I. B. Kleinert Rubber Co., New York, N. Y.
362,021. Representation of a label containing the words: **"Chesterfield De Luxe Tube Guaranteed for Life."** Tires and inner tubes. Norwalk Tire & Rubber Co., Inc., Norwalk, Conn.
362,077. **"Skyd-Pruf."** Tire treating and treading machines, cutters, etc. Peco Mfg. Corp., Philadelphia, Pa.
362,113. **"Dual Balloon 8."** Tires. General Tire & Rubber Co., Akron, O.
362,125. **"Even-Lite."** Girdles, etc. Maidwell Brassiere & Corset Co., New York, N. Y.
362,197. **Gaudette.** Girdles, brassieres, garter belts, etc. O. J. de Lendrecie Co., Fargo, N. D.
362,208. **"Airlite."** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
362,224. Rectangle containing the words: **"Correct Form"** and representation of a seal in the corner containing the words: **"Roblee Brand HS & Co."** Brassieres, girdles, etc. Hirschberg-Schutz & Co., New York, N. Y.
362,233. Representation of a woman between the words: **"Figure Beauty."** Corsets, brassieres, etc. Clear Weave Hosiery Stores, Inc., Boston, Mass.
362,249. **The Best Twins.** Corsets. Best & Co., Inc., New York, N. Y.
362,258. Representation of a label containing the words: **"Rhythm Brasee."** Corsets and brassieres. Patricia Petticoat Co., Inc., New York, N. Y.
362,275. **Three Cheers.** Brassieres, corsets, etc. Simone Co., Inc., New York, N. Y.
362,292. **Prudence.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
362,293. **Modine.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
362,318. **Sand-glo.** Corsets, etc. H. W. Gossard Co., Chicago, Ill.
362.330. **Racer.** Combs. American Hard Rubber Co., Hempstead, N. Y.
362,403. **Dem-o-Selle.** Corsets, etc. Bullock's, Inc., Los Angeles, Calif.
362,409. **Budget.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
362,410. **Femina.** Dress shields. I. B. Kleinert Rubbert Co., New York.
362,463. **Grenadier.** Tires. Grenadier Products, Inc., New York, N. Y.
362,465. **Life-Cap.** Tires and retreaded tires. I. C. Heintz, doing business as I. C. Heintz & Co., Cleveland, O.
362,479. **Lady Madison.** Brassieres, corselets, etc. Gem-Dandy Garter Co., Madison, N. C.
362,489. **Toe Saver.** Boots. Goodall Rubber Co., Inc., Philadelphia, Pa.
362,495. **Stout Control.** Corsets, brassieres, etc. H. J. Dubner, doing business as Stout Control Foundations, New York, N. Y.
362 513. **Lady Washington.** Corsets. Kresge Department Stores, Inc., Newark, N. J.

"Chemical Group Folder No. 10. Amines." Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y. This folder describes and presents in concise form the principal physical and chemical properties of 14 commercial amines used for emulsifying, neutralizing, saponifying, dissolving, and as the basis for further synthesis. A convenient table shows the most important physical properties in a form in which they can be easily compared.

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Sept. 24	Oct. 29	Nov. 5	Nov. 12	Nov. 19
Oct.	16.00	....	....	....	....
Nov.	....	16.67	16.93	16.99	15.98
Dec.	16.14	16.77	16.97	16.99	16.05
Mar.	16.25	16.82	16.95	16.94	16.04
July	16.40	16.89	16.95	16.93	16.06
Sept.	....	16.87	16.97	16.95	16.10
Oct.	....	....	16.98	16.96	16.11
Volume per week (tons)	11,450	10,220	9,510	8,160	20,790

THE Commodity Exchange table published here shows prices of representative future contracts on the New York market during the last two months.

Under the influence of trade buying and a stronger securities market, the rubber market moved upward during the early part of November and then slumped through the middle and latter part of the month. Contributing factors to this decline were: weakness of sterling and the London rubber market; the export quota increase for the first quarter of 1939; and easier securities and commodities markets. After closing at 16.71¢ per pound on October 31, March futures advanced to close at 17.14¢ per pound, the high for the month, on November 9. After this the market dropped sharply to close at 15.96¢ per pound on November 22. The closing price on November 29 was 15.75¢.

During the past three weeks the maximum variation in week-end closing prices for delivery during the next year was 0.13¢ per pound. As seen from the table, on November 12 the prices for the later months were lower than those for nearby months. Trading during the month was light.

Trade estimates of 40,000 long tons consumption in this country for October were close as the actual figure was 40,333 long tons. October was the first month in which consumption was above 40,000 long tons since September, 1937. Trade estimates for November and the current month are running at about 42,000 long tons. On page 82 are reported U. S. statistics on imports, consumption, stocks, and crude rubber afloat.

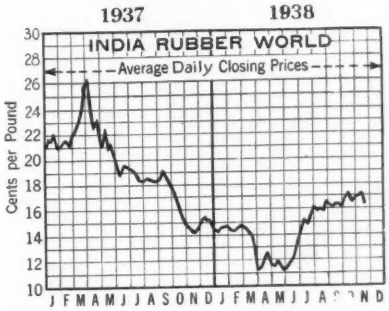
The effect of the International Rubber Regulation Committee's action on November 15 to increase the export quota to 50% for the first quarter of 1939, together with the implications of the rise in basic quota levels, are discussed on page 55 of this issue.

New York Quotations

New York outside market rubber quotations in cents per pound

	Nov. 26, 1937	Oct. 26, 1938	Nov. 28, 1938
Plantations			
Rubber latex..*gal.*	54½/55	61/62	59/60
Paras			
Upriver fine	14¾	15¼	14¾
Upriver fine	*20½	*18¼	*17¾
Upriver coarse ..	9	10	10
Upriver coarse ..	*14	*14½	*14
Islands fine	14	15	14¼
Islands fine	*20	*17½	*17
Acre, Bolivian fine	15	15½	15
Acre, Bolivian fine	*21	*18½	*18
Beni, Bolivian fine	15¾	16	15¼
Madeira fine	14¾	15¼	14¾
Caucho			
Upper ball	9	10	10
Upper ball	*14	*14½	*14
Lower ball	8	9¾	9½
Pontianak			
Pressed block.....	14/31	11/20	9½/17
Guayule			
Duro, washed and dried	12½	13¼	13
Ampar	13	13¾	13¼
Africans			
Rio Nuñez	15	14	14
Black Kassai	16	14	14
Prime Niger flake.	24	25	25
Gutta Percha			
Gutta Siak	15	11½	11¾
Gutta Soh	24	15	15
Red Macassar ...	1.20/1.25	90/1.20	90/1.20
Balata			
Block, Ciudad Bolivar	..	..	28
Manaos block	27	27	28
Surinam sheets ..	35	39	38
Amber	40	42	42

*Washed and dried crepe. Shipments from Brazil.



New York Outside Market—Spot Ribbed Smoked Sheets

Net exports of crude rubber under the restriction scheme from participating countries, exclusive of Siam and French Indo-China, during September declined sharply to 46,661 long tons from 59,465 long tons in August. September exports were 2,139 long tons below permissibles. The excess of actual over permissible exports for the first nine months of this year amounts to 3,829 long tons for all participating countries.

New York Outside Market

The outside market continued generally inactive during the past month. A fair amount of business was done, however, during the middle of the month. Shipment offerings from the Far East were too high in general for the local market. After closing at 16 11/16¢ per pound on October 31, the price of No. 1 ribbed smoked sheets advanced to close at 17¼¢ per pound on November 9, after which it fell off sharply to close at 15 7/8¢ per pound on November 29.

The week-end closing prices on No. 1 ribbed smoked sheets follow: October 29, 16 11/16¢; November 5, 17 1/16¢; November 12, 17 1/16¢; November 19, 16 1/16¢; and November 26, 15¾¢.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	October, 1938							November, 1938													
	24	25	26	27	28	29	31	1	2	3	4	5	7	8*	9	10	11*	12	14	15	16	17	18	19
No. 1 Ribbed Smoked Sheet	16 11/16	16 11/16	16 11/16	16 11/16	16 11/16	16 11/16	16 11/16	16 7/8	16 15/16	17	17 1/16	17 1/16	17 1/16	..	17 1/16	17 1/16	..	17 1/16	16 3/4	16 5/8	16 3/8	16 1/16	16	16 1/16
No. 1 Thin Latex Crepe...	17 1/16	17 1/16	18	18	17 3/4	17 3/4	17 11/16	17 7/8	17 15/16	18	18 1/16	18 1/16	18 1/16	..	18 1/16	18 1/16	..	18 1/16	17 3/4	17 5/8	17 3/8	17 1/16	17	17 1/16
No. 1 Thick Latex Crepe..	18 1/16	18 1/16	19	19	18 3/4	18 3/4	18 5/8	18 7/8	18 15/16	19	19 1/16	19 1/16	16 1/16	..	19 1/16	19 1/16	..	19 1/16	18 3/4	18 5/8	18 3/8	18 1/16	18	18 1/16
No. 1 Brown Crepe.....	16 1/16	16 1/16	16 1/16	16 1/16	15 11/16	15 11/16	16	16 3/8	16 1/16	16 1/16	16 1/16	16 1/16	16 1/16	..	16 3/4	16 5/8	..	16 1/16	16 1/4	16 1/8	15 7/8	15 11/16	15 1/2	15 7/8
No. 2 Brown Crepe.....	15 11/16	15 11/16	16 1/16	16 1/16	15 11/16	15 11/16	15 7/8	16 1/4	16 1/16	16 3/8	16 1/16	16 1/16	19 1/16	..	16 5/8	16 1/2	..	16 1/16	16 1/8	16	15 3/4	15 1/16	15 3/8	15 1/16
No. 2 Amber.....	16 1/16	16 1/16	16 1/16	16 1/16	15 11/16	15 11/16	16	16 3/8	16 1/16	16 1/2	16 1/16	16 1/16	16 1/16	..	16 3/4	16 5/8	..	16 1/16	16 1/4	16 1/8	15 7/8	15 11/16	15 1/2	15 7/8
No. 3 Amber.....	15 11/16	15 11/16	16 1/16	16 1/16	15 11/16	15 11/16	15 7/8	16 1/4	16 1/16	16 3/8	16 1/16	16 1/16	16 1/16	..	16 5/8	16 1/8	..	16 1/16	16 1/8	16	15 3/4	15 1/16	15 3/8	15 1/16
Rolled Brown.....	14 1/16	14 1/4	14 3/8	14 3/8	14 1/8	14 1/8	14 1/8	14 3/4	14 11/16	14 7/8	14 11/16	14 11/16	14 11/16	..	15 1/8	15	..	14 11/16	14 5/8	14 1/2	14 1/4	14 1/16	13 7/8	13 11/16

*Holiday.

Fragile!

Micronex Beads are fragile but not too fragile. The particles temporarily welded into a pellet are readily restored to their original fineness.

A MICRONEX BEAD breaks down immediately and completely under the shearing stresses imposed in the course of rubber mixing. Certain crushing action also is involved.

Here are shown fragments of a single crushed pellet enlarged sixty diameters. These hundreds of fragments are the product of a Micronex Bead which had a diameter of approximately .026".

BINNEY & SMITH CO.
DISTRIBUTORS
41 East 42nd St., New York, N. Y.

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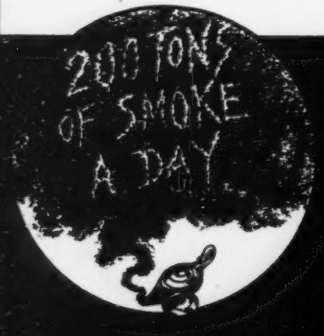
COLUMBIAN CARBON CO.
MANUFACTURERS



MICRONEX

THE *Premier* CARBON BLACK FOR RUBBER USE

Beads or Compressed

COMPOUNDING INGREDIENTS

AS PREDICTED a month ago, the demand for compounding ingredients showed a further general improvement during November. When automotive production schedules reach full anticipated activity, a further improvement in demand is expected. With the exception of an advance in carbon black, prices in general remain at last month's levels.

CARBON BLACK. Shipments of black to the rubber trade continue to move out in good volume. Producers have announced that, effective January 1, 1939, the prices for rubber grades would be advanced ¼¢ per pound from the low base level of 2¼¢ per pound (f.o.b. Texas) which has been in effect since January, 1938. Delivered prices will be advanced accordingly. Uncompressed blacks for trades other than rubber were advanced ¾¢ per pound.

Carbon black production in Texas during September averaged 1,090,590 pounds daily, according to the Texas Railroad Commission. Daily average output in August, 1938, was 1,075,907 pounds, and in September, 1937, 1,242,066 pounds.

FACTICE OR RUBBER SUBSTITUTE. The demand for rubber substitutes remains steady, with no change in prices.

LITHARGE. Call for this oxide in company with red lead continued moderately active during November. Prices have not been altered since September.

LITHOPONE. Demand continued fair at about the same level as in the previous month. Prices remain unchanged; there is indication that prices will be announced on 1939 contracts shortly after we go to press.

RUBBER CHEMICALS. The demand for rubber chemicals showed further improvement during November. Prices in general continue steady.

RUBBER SOLVENTS. Tire producers have continued to order in large quantities. Sales of rubber solvents ran ahead of other solvents during both October and November. Prices continue unchanged.

STEARIC ACID. Trade continued at a moderate level during the past month. Recent firmness of basic material did not affect stearic acid prices, and they remain at previously quoted levels.

TITANIUM PIGMENTS. Volume of these pigments continued at a moderate scale during November. Beginning November 15, contracts were offered for 1939 on the same price basis as is now in effect.

ZINC OXIDE. These oxides have continued to move into rubber consuming channels in slowly increasing quantities. As we go to press, no announcement has yet been made regarding 1939 contract prices, which, however, are not expected to change.

New York Quotations

November 23, 1938

Prices Not Reported Will Be Supplied on Application

Abrasives			
Pumicestone, powdered	lb.	$0.03	/$0.035
Rottenstone, domestic	lb.	.03	/ .035
Silica, 15	ton	38.00	
Accelerators, Inorganic			
Lime, hydrated, l.c.l., New York	ton	20.00	
Litharge (commercial)	lb.	.07	/ .075
Accelerators, Organic			
A-1	lb.	.26	
A-5-10	lb.	.35	/ .40
A-7	lb.	.42	/ .55
A-10	lb.	.35	/ .40
A-11	lb.	.52	/ .65
A-19	lb.	.52	/ .65
A-32	lb.	.70	/ .80
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
A-100-F-50	lb.	.25	/ .35
A-433	lb.	.45	/ .55
Accelerator 49	lb.	.42	
737	lb.	.42	/ .43
737-50	lb.	.25	/ .26
808	lb.	.70	/ .72
833	lb.	1.15	
Acrin	lb.	.55	
Aldehyde ammonia	lb.	.70	
Altax	lb.	.55	/ .65
B-J-F	lb.	.50	/ .55
Beutene	lb.	.70	/ .75
Butyl Zimate	lb.	2.65	
C-P-B	lb.	2.00	
Captax	lb.	.50	/ .60
Crylene	lb.	.40	/ .47
Paste	lb.	.30	/ .36
D-B-A	lb.	2.00	
Di-Esterex	lb.	.60	/ .70
N	lb.	.60	/ .70
DOTG (Di-ortho-tolylguanidine)	lb.	.44	/ .47
DPG (Diphenylguanidine)	lb.	.35	/ .45
El-Sixty	lb.	.50	/ .65
Ethylideneaniline	lb.	.42	/ .43
Ethyl Zimate	lb.	2.65	
Formaldehyde P.A.C.	lb.	.0625	
Formaldehydeaniline	lb.	.31	
Formaldehyde-para-toluidine	lb.	.52	/ .54
Guantal	lb.	.40	/ .50
Hepteen	lb.	.35	/ .40
Base	lb.	1.35	/ 1.50
Hexamethylenetetramine U.S.P.	lb.	47	
Technical	lb.	.36	
Lead oleate, No. 999	lb.	.12	
Witco	lb.	.15	
Monex	lb.	2.65	
Novex	lb.		
O. N. V.	lb.	1.00	/ 1.10
O-X-A-F	lb.	.50	/ .55
Ovac	lb.	.50	/ .55
Para-nitroso-dimethylaniline	lb.	$0.85	
Pentex	lb.	1.00	/$1.10
Pip-Pip	lb.	2.50	
Pipsolene	lb.	1.55	/ 1.85
R-2	lb.	1.40	/ 1.80
Base	lb.	3.65	
R-23	lb.	.40	
R & H 50-D	lb.	.42	/ .43
Rotax	lb.	.60	/ .65
Safex	lb.	1.20	/ 1.30
Santocure	lb.	1.05	/ 1.30
Super-sulphur No. 1	lb.	.50	
2	lb.	.18	/ .20
Tetrone A.	lb.	3.00	
Thiocarbanilide	lb.	.24	/ .30
Thionex	lb.	2.65	
Trimene	lb.	.55	/ .65
Base	lb.	1.05	/ 1.20
Triphenylguanidine (TPG)	lb.	.52	
Tuads	lb.	2.65	
Ureka	lb.	.60	/ .75
Blend B	lb.	.60	/ .75
C	lb.	.56	/ .65
Vulcanex	lb.	.42	/ .43
Vulcanol	lb.	.85	
Z-B-X	lb.	2.50	
Z-88	lb.	.44	/ .60
P	lb.	.51	
Zenite	lb.	.46	/ .48
A	lb.	.53	/ .55
B	lb.	.46	/ .48
Zimate	lb.	2.65	
Activator			
Barak	lb.	.50	
Age Resisters			
AgeRite Alba	lb.	1.50	/ 2.10
Exel	lb.	1.00	/ 1.02
Gel	lb.	.57	/ .77
Hipar	lb.	.65	/ .67
Powder	lb.	.52	/ .73
Resin	lb.	.52	/ .73
D	lb.	.52	/ .73
White	lb.	1.25	/ 1.75
Albasan	lb.	.70	/ .75
Aminox	lb.	.52	/ .61
Antox	lb.	.56	
B-L-E	lb.	.52	/ .61
Powder	lb.	.65	/ .74
B-X-A	lb.	.55	/ .61
Copper Inhibitor X-872	lb.	1.15	
Flectol B	lb.	.52	/ .65
H	lb.	.52	/ .65
White	lb.	.90	/ 1.15
M-U-F	lb.	1.50	
Neozone (standard)	lb.	.63	
A	lb.	.52	/ .54
B	lb.	.63	
C	lb.	.52	/ .54
D	lb.	.52	/ .54
E	lb.	.63	
Oxynone	lb.	$0.64	/$0.80
Parazone	lb.	.68	
Perflectol	lb.	.65	/ .75
Permalux	lb.	1.20	
Santoflex A	lb.	.65	/ .75
B	lb.	.52	/ .65
Santowhite	lb.	.95	/ 1.20
Solux	lb.	1.30	
Thermoflex A	lb.	.65	/ .67
V-G-B	lb.	.52	/ .61
Alkalies			
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	2.70	/ 3.55
liquid, 50%	100 lbs.	1.95	
solid (700 lb. drums)	100 lbs.	2.30	/ 3.15
Antiscorch Materials			
A-F-B	lb.	.35	/ .40
Antiscorch T	lb.	.90	
R-17 Resin (drums)	lb.	.10	
RM	lb.	1.25	
Retarder W	lb.	.36	
U.T.B.	lb.	.35	/ .40
Antisun Materials			
Heliozone	lb.	.27	
Sunproof	lb.	.27	/ .30
Colors			
BLACK			
Du Pont powder	lb.	.42	/ .44
Lampblack (commercial)	lb.	.15	
BLUE			
Brilliant	lb.		
Du Pont dispersed	lb.	.70	/ 3.60
Powders	lb.	.45	/ 3.75
Prussian	lb.	.0375	
Toners	lb.	.08	/ 3.85
BROWN			
Mapico	lb.	.11	
GREEN			
Brilliant	lb.		
Chrome, light	lb.		
medium	lb.	.22	
oxide (freight allowed)	lb.		
Dark	lb.		
Du Pont dispersed	lb.	.87	/ 1.60
Powders	lb.	1.00	/ 2.00
Guignet's, Easton, Pa., bbls.	lb.	.70	
Light	lb.		
Toners	lb.	.85	/ 3.75
ORANGE			
Du Pont dispersed	lb.	.80	/ .90
Powders	lb.	.80	/ 2.50
Lake	lb.		
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.15

PURPLE			
Permanent	lb.		
Toners	lb.	$0.60	/$2.10
RED			
Antimony			
Crimson, 15/17%	lb.	.45	
R. M. P. No. 3	lb.	.48	
Sulphur free	lb.	.50	
R.M.P.	lb.	.52	
Golden 15/17%	lb.	.28	
7-A	lb.	.37	
Z-2	lb.	.23	
Aristi	lb.	1.75	
Cadmium, light (400 lb. bbls.)	lb.	.70	/ .75
Chinese	lb.		
Crimson	lb.		
Du Pont dispersed	lb.	.85	/ 2.05
Powders	lb.	.30	/ 1.40
Mapico	lb.	.0925	
Medium	lb.		
Rub-Er-Red, Easton, Pa., bbls.	lb.	.0925	
Scarlet	lb.		
Toners	lb.	.08	/ 2.00
WHITE			
Lithopone (bags)	lb.	.04½/	.04⅝
Albalith Black Label-11	lb.	.04½/	.04⅝
Astrolith	lb.	.04½/	.04⅝
Azolith	lb.	.04½/	.04⅝
Cryptone-19	lb.	.05⅝/	.05⅞
CB-21	lb.	.05⅝/	.05⅞
ZS No. 20	lb.	.08⅜/	.08⅝
86	lb.	.08⅜/	.08⅝
230	lb.	.08⅜/	.08⅝
Sunolith	lb.	.04½/	.04⅝
Ray-Bar	lb.	.05⅝/	.06⅜
Ray-Cal	lb.	.05⅝/	.06⅜
Rayox	lb.	.15	/ .18
Titanolith (5-ton lots)	lb.	.05⅝/	.05⅞
Titanox-A (50-lb. bags)	lb.	.15	/ .16
B (50-lb. bags)	lb.	.05⅝/	.05⅞
30 (50-lb. bags)	lb.	.05⅝/	.05⅞
C (50-lb. bags)	lb.	.05⅝/	.05⅞
M	lb.	.05⅝/	.05⅞
Ti-Tone	lb.		
Zinc Oxide			
Azo ZZZ-11	lb.	.0625/	.065
44	lb.	.0625/	.065
55	lb.	.0625/	.065
66	lb.	.0625/	.065
French Process, Florence			
White Seal-7 (bbls.)	lb.	.085	/ .0875
Green Seal-8	lb.	.08	/ .0825
Red Seal-9	lb.	.075	/ .0775
Kadox, Black Label-15	lb.	.065	/ .0675
No. 25	lb.	.075	/ .0775
Red Label-17	lb.	.065	/ .0675
Horse Head Special 3	lb.	.0625/	.065
XX Red-4	lb.	.0625/	.065
23	lb.	.0625/	.065
72	lb.	.0625/	.065
78	lb.	.0625/	.065
80	lb.	.0625/	.065
103	lb.	.0625/	.065
110	lb.	.0625/	.065
St. Joe (lead free)			
Black Label	lb.	.0625/	.065
Green Label	lb.	.0625/	.065
Red Label	lb.	.0625/	.065
U.S.P.	lb.	.095	/ .0975
White Jack	lb.	.05⅝/	.05⅞
Zopaque (bags)	lb.	.15	/ .1575
YELLOW			
Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45	/ .50
Du Pont dispersed	lb.	1.25	/ 1.60
Powders	lb.	.70	/ 1.37
Lemon	lb.		
Mapico	lb.	.0675	
Toners	lb.	2.50	

Dispersing Agents

Darvan	lb.	.30	/ .50
Nevoil (drums)	lb.	.0215	
Santomerse S	lb.	.11	/ .25

Fillers, Inert

Asbestine, c.l., f.o.b., mills	ton	15.00	
Barytes	ton	30.00	/36.00
f.o.b., St. Louis (50 lb. paper bags)	ton	22.85	
off color, domestic	ton	20.00	/25.00
white, imported	ton	29.00	/32.00
Blanc fixe, dry, precip.	lb.	.03	/ .035
Calcene	ton	37.50	/43.00
Infusorial earth	lb.	.02	/ .03
Kalite No. 1	ton	24.00	/50.00
3	ton	34.00	/60.00
Magnesia, calcined, heavy	lb.	.04	
Carbonate, l.c.l.	lb.	.07	/ .095
Pyrax A	ton	7.50	/20.00
Whiting			
Columbia Filler	ton	9.00	/14.00
Guilders	100 lbs.		
Hakuenka	lb.		
Paris white, English cliff-stone	100 lbs.		
Southwark Brand, Commercial	100 lbs.		
All other grades	100 lbs.		
Suprex, white extra light	ton	45.00	/60.00
heavy	ton	45.00	/60.00
Witco, c.l.	ton	6.00	

Finishes

Rubber lacquer, clear	gal.		
colored	gal.		
Starch, corn, pwd.	100 lbs.		
potato	lb.		
Talc	ton	$25.00	/$45.00

Flock

Cotton flock, dark	lb.	.11	/ .13
dyed	lb.	.45	/ .85
white	lb.	.18	/ .20
Rayon flock, colored	lb.	1.10	/ 2.00
white	lb.	.90	

Latex Compounding Ingredients

Accelerator 85	lb.	.35	
89	lb.	1.40	
122	lb.	1.55	
552	lb.	2.50	
Aerosol	lb.	.45	
Antox, Dispersed	lb.	.42	
Aquarex A	lb.	.35	
D	lb.	.75	
F	lb.	.85	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400, dry	lb.	.51	/ .65
Black No. 25, Dispersed	lb.	.22	/ .40
Catalpo	ton		
Collocarb	lb.	.055	/ .07
Color Pastes, Dispersed	lb.	.35	/ 1.75
Dispersex No. 15	lb.	.11	/ .12
No. 20	lb.	.08	/ .10
Emo, brown	lb.	.15	
white	lb.	15.	
Factice Compound, Dispersed	lb.	.36	
Heliozone, Dispersed	lb.	.25	
Igepon A	lb.		
MICRONEX, Colloidal	lb.	.055	/ .07
Nekal BX (dry)	lb.		
Palmol	lb.	.10	
Pipsol X	lb.	3.05	/ 3.55
R-23	lb.	.57	
RN-2	lb.	1.40	/ 1.80
S.1 (400 lb. drums)	lb.	.65	
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
No. 1	lb.	.18	/ .35
No. 2	lb.	.18	/ .35
No. 3	lb.	.40	/ .65
Santovar A	lb.	1.15	/ 1.40
Stablex A	lb.	.90	/ 1.10
B	lb.	.65	/ .90
C	lb.	.40	/ .50
Sulphur, Dispersed	lb.	.10	/ .15
No. 2	lb.	.075	/ .15
T.1. (400 lb. drums)	lb.	.40	
Tepidone	lb.	1.55	
Vulcan Colors	lb.		
Zinc oxide, Dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond	ton	25.00	
Genasco Hydrocarbon, granulated, (fact'y)	ton		
solid	ton		
Gilsonite Hydrocarbon (factory)	ton		
Hydrocarbon, hard	ton	22.00	/42.00
Parmr Grade 1	ton	25.00	/27.00
2	ton	25.00	/27.00
Pioneer	ton		
285°-300°	lb.	22.00	/42.00

Mold Lubricants

Mold Paste	lb.	.12	/ .18
Sericite	ton	65.00	/75.00
Soapbark	lb.		
Soapstone	ton	25.00	/35.00

Oil Resistant

AXF	lb.	.40	/ .50

Reenforcers

Carbon Black			
Aerfloted Arrow Specification Black	lb.	.0275/	.0625
Arrow Compact Granulized Carbon Black	lb.	.0275/	.0625
"Certified" Heavy Compressed, Cabot	lb.		
Spheron	lb.		
Carbitum	ton	58.00	/63.00
Continental Dustless, c.l.	lb.	.0275/	.0375
Compressed c.l.	lb.	.0275/	.0375
Uncompressed, c.l.	lb.	.0275/	.0375
Disperso, c.l.	lb.	.0275/	.0375
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Dixiedensed, 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	$0.0375	
local stock, bags, delivered	lb.	.0625	
Excello, c.l., f.o.b Gulf ports	lb.	.0275/	$0.0475
delivered New York	lb.	.0375/	.0575
l.c.l., delivered New York	lb.	.0625/	.07
Fumonex, c.l., f.o.b. works	lb.	.03	
ex-warehouse	lb.	.05	
Gastex	lb.	.03	/ .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Kosmobile 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0275	
c.l., delivered New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0275	
c.l., delivered, New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Mark II, c.l., f.o.b Gulf ports	lb.	.0275	
c.l., delivered, New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Standard, c.l., f.o.b. Gulf ports	lb.	.0275	
c.l., delivered, New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
W-5, c.l., f.o.b., Gulf ports	lb.	.0275	
c.l., delivered, New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
W-6, c.l., f.o.b., Gulf ports	lb.	.0275	
c.l., delivered, New York	lb.	.0375	
local stock, bags, delivered	lb.	.0625	
Paradene No. 2 (drums)	lb.	.04	
Pelletex	lb.	.03	/ .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0275/	.0475
delivered New York	lb.	.0375/	.0575
l.c.l., delivered New York	lb.	.0625/	.07
"WYEX BLACK"	lb.	.0275/	.0625

Clays

Aerfloted Paragon (50 lb. bags)	ton	9.50	/22.00
Suprex (50 lb. bags)	ton	9.50	/22.00
China	ton	17.50	/20.00
Crown, f.o.b. (plant)	ton	9.50	
Dixie	ton	11.00	/30.00
Junior	ton	9.50	/29.00
McNamee	ton	9.50	/22.00
Par	ton	9.50	/22.00
Witco, f.o.b. works	ton	9.50	
P-33	lb.	.0475/	.0775
Thermax	lb.	.175	/ .05
Velvetex	lb.	.022	/ .035

Reodorants

Amora A	lb.		
B	lb.		
C	lb.		
D	lb.		
Curodex 19	lb.	2.75	
188	lb.	3.50	
198	lb.	4.50	
Rodo No. 0	lb.	3.50	/ 4.00
10	lb.	4.50	/ 5.00

Rubber Substitutes

Black	lb.	.07	/ .11
Brown	lb.	.07	/ .12
White	lb.	.08	/ .13
Factice			
Amberex	lb.	19	
Brown	lb.	.07	/ .11
Neophax A	lb.	.10	
B	lb.	.10	
Pac-Cel B	lb.	.12	
C	lb.	.12	
White	lb.	.08	/ .12

Softeners

Bondogen	lb.	.98	/ 1.65
Burgundy pitch	lb.	.06	
Cycline oil	gal.	.14	/ .20
Nuba resinous pitch (drums)			
Grades No. 1 and No. 2	lb.	.03	
Grade No. 3	lb.	.04	

(Continued on page 84)

RUBBER MACHINERY

By

HENRY C. PEARSON

✦

AN ENCYCLOPEDIA OF MACHINES USED IN RUBBER PREPARATION AND MANUFACTURE

✦

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Regular and Special Constructions of

COTTON FABRICS

Single Filling Double Filling and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry
320 BROADWAY
NEW YORK

COTTON AND FABRICS

New York Quotations

November 28, 1938

Drills		
38-inch 2.00-yard	yd.	$0.11
40-inch 3.47-yard		.06¾
50-inch 1.52-yard		.14½
52-inch 1.85-yard		.12¼
52-inch 1.90-yard		.11¾
52-inch 2.20-yard		.10¾
52-inch 2.50-yard		.09½
59-inch 1.85-yard		.12
Ducks		
38-inch 2.00-yard D.F.	yd.	.11 /.11½
40-inch 1.45-yard S. F.		.15
51½-inch 1.35-yard D. F.		.16¼
72-inch 1.05-yard D. F.		.21⅞/.22⅞
72-inch 17.21-ounce		.23⅞
Mechanicals		
Hose and belting	lb.	.24½
Tennis		
52-inch 1.35-yard	yd.	.16½
Hollands		
Gold Seal and Eagle		
20-inch No. 72	yd.	.09
30-inch No. 72		.16
40-inch No. 72		.18
Red Seal and Cardinal		
20-inch	yd.	.07½
30-inch		.13¾
40-inch		.15
50-inch		.24
Osnaburgs		
40-inch 2.34-yard	yd.	.09¼
40-inch 2.48-yard		.08⅝
40-inch 2.56-yard		.08
40-inch 3.00-yard		.07½
40-inch 7-ounce part waste		.06¾
40-inch 10-ounce part waste		.09½
37-inch 2.42-yard		.09
Raincoat Fabrics		
Cotton		
Bombazine 60 x 64	yd.	.07½
Plaids 60 x 48		.09¾
Surface prints 60 x 64		.11¼
Print cloth, 38½-inch, 60 x 64		.04½
Sheetings, 40-inch		
48 x 48, 2.50-yard	yd.	.07
64 x 68, 3.15-yard		.06¾
56 x 60, 3.60-yard		.05⅞
44 x 40, 4.25-yard		.04½
Sheetings, 36-Inch		
48 x 48, 5.00-yard	yd.	.04¼
44 x 40, 6.15-yard		.03¼
Tire Fabrics		
Builder		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.27
Chafer		
14 ounce 60" 20/8 ply Karded peeler	lb.	.27
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.26
Cord Fabrics		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.28
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.26
23/5/3 Karded peeler, 1¼" cotton	lb.	.33½
23/5/3 Combed Egyptian	lb.	.47
Leno Breaker		
8¾ ounce and 10¼ ounce 60" Karded peeler	lb.	.29

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Sept. 24	Oct. 29	Nov. 5	Nov. 12	Nov. 19
Oct.	7.82	....	....	....	....
Nov.	....	8.58	8.45	8.64	....
Dec.	7.86	8.55	8.43	8.62	8.59
Mar.	7.88	8.42	8.33	8.52	8.42
July	7.86	8.10	8.08	8.21	8.03
Sept.	....	7.92	7.91	8.05	7.84
Oct.	....	7.83	7.82	7.98	7.75

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures covering the past two months.

The New York spot middling price closed at 8.68¢ per pound on November 1. The price remained steady during the first two weeks, closing at 8.75¢ on November 14 and at 8.66¢ on November 19. The closing price on November 29 was 8.98¢ per pound.

Sales at 13 southern markets totaled 235,704 bales during 14 days since November 1, against 312,055 bales for the same days one year ago. On November 18 it was announced that cotton loans made by the Commodity Credit Corp. and other lending agencies through November 17 totaled $124,029,437 on 2,683,899 bales, an average of 8.88¢ per pound.

Consumption of all cotton in domestic mills totaled 542,778 bales during October, comparing with 534,037 in September and 524,188 a year ago, according to a report of the Census Bureau.

Fabrics

The demand for cotton textiles has further improved since our report of last month, producers reporting brisk activity at present. Contracts are being made for large volume orders, many of which will run through the first quarter of 1939. Wide drills and similar fabrics, long inactive, are now in good demand. Declining mill inventories and the increased contract engagement of producing machinery are factors which point toward sustained improvement. The sheeting market which witnessed broad activity through the middle of the month has become quiet but firm. Raincoat manufacturers report improved business with department stores buying for the Christmas trade.

The market is generally firm with a number of fabrics showing small advances. Producers expect a further upturn in fabric prices in the near future.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for October, 1938:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	6,168	437
United States	17,794	404
Continent of Europe	6,895	374
British possessions	3,427	60
Japan	5,418	19
Other countries	1,298	..
Totals	41,000	1,294

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	5,910	87
Dutch Borneo	2,116	5
Java and other Dutch Islands	205	..
Sarawak	1,431	1
British Borneo	589	16
Burma	186	7
Siam	3,709	1,331
French Indo-China	800	94
Other countries	112	..
Totals	15,058	1,541

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	Inquiry
2529	Suppliers of machinery and latex for making prophylactics.
2530	Supplier of Saprotin.
2531	Manufacturer of mineral-oil-proof industrial gloves.
2532	Manufacturers of batteries in the New York metropolitan area.
2533	Manufacturer of rubber airwheels, stamped E. Sioux Rubber Products, for model airplanes.
2534	Manufacturers of physicians' finger cots.
2535	Manufacturer of latex saturating machine for paper.
2536	Manufacturer of rubber brush to fit over metal head of bath spray.
2537	Manufacturer of machine to cut thin-gage narrow strip rubber into rubber threads.
2538	Manufacturers of artificial leather and proofed fabrics.

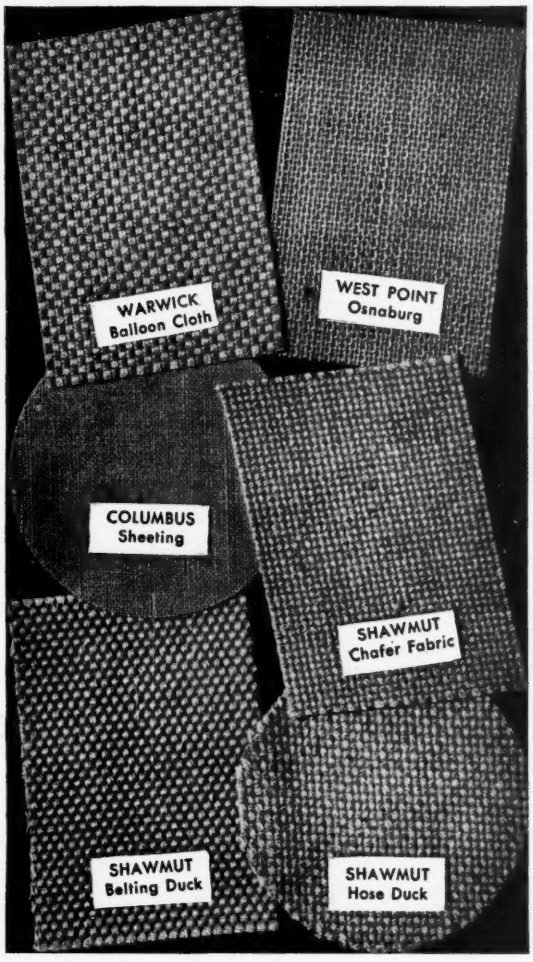
Statistics of Income

(*Continued from page* 55)

year back to 1927. In 1936 it appears that 94.8% of the business done by the industry was profitable, against 85.2% in 1935, 48% in 1934, and 64.2% in 1929, when rubber price conditions were in some ways similar to those of 1937.

	Corporations Reporting Net Income					Reporting No Net Income			All Corporations		
Year	Returns	Gross Income†	Net Income†	Taxes Paid†	Net After Taxes†	Returns	Gross Income†	Deficit†	*Returns	Gross Income†	Net after Tax and Deficit†
1929	311	916,242	56,324	6.065	50,269	303	510,967	39,191	638	1,427,209	11,078
1930	227	559,565	12,242	1,336	10,906	354	540,748	63,876	607	1,100,313	—52,970
1931	174	401,314	14,004	1,371	12.633	361	415,317	38,154	552	816.631	—25,521
1932	96	127,581	2,779	301	2,478	426	507,935	41.517	544	635,516	—39,039
1933	215	300.313	13,339	1,867+52‡	11,420	330	418.134	10,000	572	718,447	1,420
1934	267	362,756	14,976	2,094+20‡	12,862	340	393,498	10,566	650	756,254	2,296
P—1935	286	671,861	30,119	4,141+323‡	25,654	312	116,885	6,989	632	788,746	18,665
P—1936	330	910,991	54,771	8,520+119‡	46,132	259	50,872	3,183	618	961,863	42,949

P—Preliminary statistics. *Under "all corporations" returns from "Inactive" corporations are counted. †In thousands of dollars. ‡Excess profits tax.



OUR FABRIC IS THE KEYSTONE

of a good many rubber products

And knowing this, it's natural that we're watching production day in and day out to be sure that the fabrics we make and sell are as consistent in construction and performance as it is possible to make them. Chemically as well as physically, we work to the requirements of the rubber engineer. In our process of manufacturing, we are particularly careful to avoid using any substances which would be injurious in rubber processing. In addition to usual fabric constructions, we are extremely interested to cooperate with rubber engineers in developing fabrics to meet special specifications.

WELLINGTON SEARS COMPANY

65 Worth Street, New York, N. Y.

BOSTON CHICAGO DETROIT PHILADELPHIA ATLANTA ST. LOUIS NEW ORLEANS LOS ANGELES SAN FRANCISCO

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption‖ Tons	U. S. Stocks Mfgrs., Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.—Public Warehouses, London Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1936	490,858	575,000	223,000	56,567	78,462	26,969	855,600	1,044,195	538,028
1937	584,851	543,600	262,204	63,099	57,785	44,792	1,135.337	1,098,760	639,025
1938									
January	42,135	29,429	274,581	57,356	62,108	48,494	80,372	**70,453	a634,330
February	43,930	23,868	294,338	47,459	71 516	46,241	81,008	61,018	a653,791
March	35,967	30,487	299,172	41,882	76,617	50,797	81,172	78,634	a670,332
April	30,807	27,984	301,436	39,071	82,754	40,614	86,725	70,714	a668,440
May	27,410	28,947	299,720	32,859	87,215	40,598	64 406	77,326	a653,865
June	26,011	30,629	294,566	32,079	92,312	44,729	70,871	69,982	a670,068
July	22,918	32,209	284,914	40,400	95,252	45,529	79,630	73,383	a670,873
Aug.	31,099	38,170	277,463	47,772	99 614	41,002	74,598	73,869	a654,646
Sept.	37,374	37,823	276,586	48,927	98,140	35,386	70,852	78,035	.....
Oct.	34,496	40,333	269,937	51,062	.....	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, regulated areas, and afloat. ‖Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U. K. manufacturers' stocks for any month during 1937. The figure will be included in yearly total. a Japan stocks not included.

RECLAIMED RUBBER

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1936	150,571	141,486	24.6	19,000	7,085
1937	185,033	162,000	29.8	28,800	13,233
1938					
Jan.	7,698	6,940	23.6	28,900	658
Feb.	6,198	7,141	29.9	27,487	470
Mar.	6,875	8,471	27.8	25.432	459
Apr.	6,399	7,480	26.7	23,339	426
May	6,866	8,009	27.7	22.275	550
June	7,584	8,274	27.0	21,040	658
July	7,109	8,273	25.7	18.832	720
Aug.	10,472	10,732	28.1	17,892	557
Sept.	12,016	11,281	29.8	18,127	759
Oct.	13,558	11,803	29.3	19,090	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage. *Compiled by The Rubber Manufacturers Association, Inc.*

ACCORDING to R.M.A. statistics, October reclaimed rubber consumption is estimated at 11,803 long tons, 4.6% greater than in September; production at 13,558 long tons; and stocks on hand October 31, 19,090 long tons. Reclaimers expect that November consumption figures will at least equal those of October and that present activity will continue the rest of 1938.

The market is steady with prices of all grades continuing unchanged.

New York Quotations

November 22, 1938

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6 / 6¼
Acid	1.18-1.22	6¾/ 7
Shoe		
Standard	1.56-1.60	6½/ 6¾
Tubes		
No. 1 Floating	1.00	12 /12¾
Compound	1.10-1.20	8 / 8¾
Red Tube	1.15-1.30	8 / 8¾
Miscellaneous		
Mechanical Blends	1.25-1.50	4¾/ 5
White	1.35-1.50	11½/12

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Tire Production Statistics

	Pneumatic Casings Inventory	Production	Shipments
1936	11,114,399	58,116,349	55,362,739
1937	10,767,799	55,284,415	55,466,329
1938			
Jan.	10,987,967	2,776,046	2,500,148
Feb.	10.833,036	2,238,167	2,359,098
Mar.	10.819,552	2,792,440	2,890.749
Apr.	10,316,774	2,737,235	3,272,875
May	9,855,360	2,723,524	3,405,036
June	8,762,674	3,109.170	4,066,918
July	8,201,415	3,352,601	3,947,431
Aug.	8.329,590	4.093.234	4,045,540
Sept.	8,406,261	3,970,397	3,943,486
Oct.	8,518,867	4 275,619	4,285,233

	Inner Tubes Inventory	Production	Shipments
1936	10,985,273	57.247,553	54,624,321
1937	10,235,517	51,986,167	52,376,657
1938			
Jan.	10,164,141	2,417,920	2,423.856
Feb.	10.161,093	2,132.013	2,127,260
Mar.	10,129,854	2,474,821	2,544,480
Apr.	9,524,959	2,199.116	2,781,908
May	9.010,245	2.260,841	2,889,799
June	8.107,626	2,717,316	3,629,224
July	7.511.679	2,784.418	3,356,929
Aug.	7,808,270	3,814,738	3,570,011
Sept.	7,907,109	3,863.025	3.615,201
Oct.	7,628,811	3,869,641	4,067,277

Source: **The Rubber Manufacturers Association, Inc. Figures adjusted to represent 100% of the industry.**

CRUDE rubber consumption by United States manufacturers during October is estimated at 40,333 long tons, against 37,823 long tons during September, 1938, a 6.6% increase over September and 4.1% over the 38,754 (revised) long tons consumed in October, 1937, according to R.M.A. statistics.

Gross imports of crude rubber for October are reported to be 34,496 long tons, 7.7% under the September figure of 37,374 long tons and 34.3% under the 52,508 long tons imported in October, 1937.

Total domestic stocks of crude rubber on hand October 31 are estimated at 269,937 long tons, against September 30 stocks of 276,586 long tons and 200,-025 long tons on hand October 31, 1937.

Crude rubber afloat to United States ports as of October 31 is estimated at 51,062 long tons, compared with 48,927 long tons afloat on September 30 and 80,653 long tons afloat on October 31 a year ago.

London and Liverpool Stocks

Week Ended	Tons London	Liverpool
October 29	59,856	33,656
November 5	58,753	33,405
November 12	58,385	33,267
November 19	58,009	32,191
November 26	57,685	31,918

RUBBER SCRAP

FURTHER improved activity by reclaimers during November resulted in a continued upward trend in demand for scrap rubber. The better demand is said to originate from the improved activity of the automotive industry.

Better business was reflected in a firmer market with price advances being noted in all groups of scrap rubber with the exception of boots and shoes.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

November 22, 1938

		Prices
Boots and Shoes		
Boots and shoes, black	lb.	$0.01 /$0.01⅛
Colored	lb.	.00¾/ .00⅞
Untrimmed arctics	lb.	.00¾/ .00⅞
Inner Tubes		
No. 1, floating	lb.	.08 / .08½
No. 2, compound	lb.	.03½/ .04
Red	lb.	.03½/ .04
Mixed tubes	lb.	.03¾/ .03⅞
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	11.00 /11.50
Beadless	ton	15.50 /16.50
Auto tire carcass	ton	17.00 /18.00
Black auto peelings	ton	16.00 /17.00
Solid		
Clean mixed truck	ton	22.50 /25.00
Light gravity	ton	29.00 /32.00
Mechanicals		
Mixed black scrap	ton	15.00 /18.00
Hose, air brake	ton	21.00 /24.00
Garden, rubber covered	ton	10.00 /11.00
Steam and water, soft	ton	10.00 /10.50
No. 1 red	lb.	.03 / .03½
No. 2 red	lb.	.02 / .02½
White druggists' sundries	lb.	.03¾/ .04
Mixed mechanicals	lb.	.02¼/ .02½
White mechanicals	lb.	.03¾/ .04
Hard Rubber		
No. 1 hard rubber	lb.	.11 / .11½

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

GENERAL FOREMAN WITH 18 YEARS' EXPERIENCE IN THE rubber industry. Complete knowledge in the manufacture of upholstery cloth, raincoat material, hospital sheeting, baby carriage material, all kinds of calendered goods. Address Box No. 1025, care of INDIA RUBBER WORLD.

PRACTICAL INDUSTRIAL ENGINEER: EIGHTEEN YEARS' experience in the rubber business as machine designer, chief draftsman, equipment engineer, production foreman, and superintendent. Have made special study of line production and cost reduction by elimination of unnecessary motions. Address Box No. 1027, care of INDIA RUBBER WORLD.

PRESSROOM FOREMAN WITH 20 YEARS' EXPERIENCE IN rubber industry. Knowledge of heels, soles, tiling, slab stocks and matting, with some millroom experience. Address Box No. 1030, care of INDIA RUBBER WORLD.

RUBBER TECHNOLOGIST—TWELVE YEARS' EXperience, mechanicals, hard rubber, dipped goods. Thoroughly familiar modern compounding practice and production methods. Graduate chemist. Have responsible position but desire change. Address Box No. 1033, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

MANUFACTURERS' AGENT WITH FOLLOWING OF CHAIN store buyers for the past 15 years is interested in securing additional lines. Address Box No. 1028, care of INDIA RUBBER WORLD.

FOR SALE: CONCRETE STEEL FULLY EQUIPPED TIRE PLANT also suitable for mechanical goods. Experienced labor available. Address Box No. 1031, care of INDIA RUBBER WORLD.

A YOUNG MAN CAPABLE OF OPERATING A SMALL RUBBER plant making a line of molded and extruded goods can make an excellent connection. Location near Detroit; good labor conditions; fine sales outlets. A one-half interest can be secured by the right party for $4,500. Write full information for interview. Address Box No. 1032, care of INDIA RUBBER WORLD.

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Sponge Rubber: Sheeted—Die Cut—Molded
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Mount Airy, Philadelphia, Pa., U. S. A.

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SALESMEN WANTED ON COMMISSION TO SELL BRAND NEW line of rubber mats made from tires. Excellent new design, also automobile reliners and patches. Address Box No. 1026, care of INDIA RUBBER WORLD.

WANTED—

Assistant working foreman for a small rubber department in Chicago Brass Manufacturing concern. Must operate mill and calender, and must have some experience on presses also compounds. Send full details of experience, training and personal history in reply. Address Box No. 1029, care of INDIA RUBBER WORLD.

We are looking for a
SELLING AGENT
living in Chicago **who would sell our special mechanical rubber goods in U. S. A. on commission basis. Only first-class men knowing this branch and customers, apply by air-mail with photo and full details to HARO Manufacturers of Rubber Goods, Melnik 2, Czechoslovakia.**

SALARIED POSITIONS
OUR SYSTEM OF SEARCHING OUT SALARIED POSITIONS, hiding your identity, increases your salary commensurate with training and experience, and with definite results. Write (Rubber Dept.) EXECUTIVE'S PROMOTION SERVICE, 300 B St., S.E., Washington, D. C.

WANTED: A CHEMICAL ENGINEER OR RUBBER CHEMIST experienced in hard and soft rubber methods, compounding and general laboratory procedure. State qualifications, references, and salary expected. Location in East. Address Box No. 1034, care of INDIA RUBBER WORLD.

WANTED: YOUNG EXECUTIVE WITH GENERAL BACKGROUND qualified to organize and direct sales and conduct functions of general manager in new company whose products are considered revolutionary. Belting experience preferred. Salary. Possible opportunity to earn an ownership participation. Address Box No. 1035, care of INDIA RUBBER WORLD.

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COILS OF STEEL, WIRE AND HOSE
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325 A Street Boston, Mass.

(*Advertisements continued on page* 85)

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(*Continued from page 70*)

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United States Latex Imports

Year	Pounds (d.r.c.)	Value
1936	44,469,504	$6,659,899
1937	51,934,040	10,213,670
1938		
Jan.	3,135,524	494,242
Feb.	3,772,897	560,883
Mar.	2,192,459	327,844
Apr.	1,991,943	295,690
May	1,968,576	279,502
June	1,556,507	214,420
July	1,420,136	209,526
Aug.	1,963,304	308,573
Sept.	1,529,673	235,242

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

U. S. Crude and Waste Rubber Imports for 1938

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Totals 1938	Totals 1937	Balata	Miscellaneous	Waste
Jan. ....tons	39,744	1,259	411	177	6	538	42,135	32,820	41	526	8
Feb.	41,709	1,400	453	150	..	218	43,930	43,289	35	808	22
Mar.	34,252	861	371	278	..	205	35,967	52,039	37	555	93
Apr.	29,662	690	324	...	1	130	30,807	35,850	73	1,046	33
May	25,967	696	195	326	1	225	27,410	50,840	32	647	5
June	25,141	640	20	60	..	150	26,011	48,956	35	901	23
July	21,883	656	64	52	9	254	22,918	39,108	57	828	12
Aug.	29,560	880	170	170	..	319	31,099	48,785	84	649	14
Sept.	36,190	837	221	26	25	75	37,374	56,049	92	889	80
Oct.	32,564	795	408	450	153	126	34,496	52,508	70	729	38
Total 10 mos., 1938.....tons	316,672	8,714	2,637	1,689	195	2,240	332,147	.....	556	7,578	328
Total 10 mos., 1937.....tons	433,189	18,652	5,046	959	139	2,259	.....	460,244	339	6,671	3,173

Compiled from The Rubber Manufacturers Association, Inc., statistics.

New York Quotations

(*Continued from page 78*)

Softeners (*Cont'd*)

Palm oil (Witco), c.l.	lb.	$0.0575
Pine tar	gal.	
Plastogen	lb.	.0775/$0.125
R-19 Resin (drums)	lb.	.10
R-21 Resin (drums)	lb.	.10
Reogen	lb.	.115 / .30
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	.65
2	lb.	.65
Rubtack	lb.	.10
Tackol	lb.	.085 / .18
Tonox D	lb.	.75 / .85
Witco No. 20	gal.	.20
X-1 Resinous oil (tank car)	lb.	.01

Solvents

Beta-Trichlorethane	gal.	
Carbon bisulphide	lb.	
tetrachloride	lb.	
Industrial 90% benzol (tank car)	gal.	.16
Skellysolve	gal.	

Stabilizers for Cure

Laurex, ton lots	lb.	.12 / .14
Stearex B	lb.	.105 / .115
Beads	lb.	.09 / .10
Stearic acid, single pressed	lb.	.105 / .115
Stearite	100 lbs.	.09
Zinc stearate	lb.	.23

Synthetic Rubber

Neoprene Type E	lb.	.65
G	lb.	.70
H	lb.	.78
M	lb.	.65
Latex Type 57	lb.	.30
"Thiokol" A	lb.	.30
Coating materials	gal.	2.50 / 5.00
DX	lb.	.45
Molding Powder	lb.	.61 / .71

Varnish

Shoe	gal.	1.45

Vulcanizing Ingredients

Sulphur		
Chloride, drums	lb.	.035 / .04
Rubber	100 lbs.	2.65
Telloy	lb.	1.75 / 2.00
Vandex	lb.	1.75 / 2.00
(See also Colors—Antimony)		

Waxes

Carnauba, No. 3 chalky	lb.	.37½
2 N.C.	lb.	.39⅞
3 N.C.	lb.	.37½
1 Yellow	lb.	.4575
2	lb.	.4425
Montan, crude	lb.	.11

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.†	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1936	475,500	62,700	14,400	9,600	27,900	8,800	56,800	71,800	16,000	61,700	31,000	64,600	831,300
1937	592,528	137,351	19,257	14,969	36,087	13,063	59,959	98,170	23,980	62,205	30,462	72,589	1,115,700
1938													
Jan.	45,596	17,811	617	1,258	1,789	1,102	4,780	6,314	1,809	4,935	693	5,864	90,215
Feb.	40,977	19,149	621	974	615	1,771	5,420	6,959	2,000	3,173	2,341	5,558	86,914
Mar.	42,075	18,134	1,084	961	2,123	1,323	4,823	10,768	1,365	6,222	2,162	5,932	94,750
Apr.	31,870	16,572	647	904	999	920	5,721	6,497	2,397	5,456	4,281	5,820	80,165
May	27,809	17,783	1,087	1,137	2,545	957	5,249	9,595	2,422	3,328	4,163	6,890	79,857
June	26,429	15,314	825	853	3,243	988	4,552	7,478	2,399	2,156	504	6,709	70,189
July	22,209	13,555	1,251	1,106	2,685	636	4,543	6,927	3,641	3,100	541	6,211	65,527
Aug.	31,493	14,925	1,444	1,238	1,832	595	3,616	7,190	2,045	2,034	1,000*	5,703	71,081

*Estimated. †U. K. figures show gross imports, not net imports. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Total	Philippines and Oceania	Liberia†	Other Africa	South America	Mexican Guayule	Grand Total
1936.....	353,700	309,600	49,700	8,600	5,800	8,200	21,000	34,600	40,800	832,000	1,600*	1,600	4,500	14,700	1,200	855,600
1937.....	469,960	431,674	70,358	9,778	7,232	13,213	25,922	35,551	43,374	1,107,062	1,617*	2,251	5,427	16,288	2,692	1,135,337
1938																
Jan.	30,998	26,466	5,222	841	538	1,307	3,485	2,897	6,088	77,842	138	501	415	938	538	80,372
Feb.	37,166	27,366	5,216	639	770	918	8	3,266	3,070	78,419	125	168	438	1,640	218	81,008
Mar.	33,567	31 268	3,834	532	703	853	1,564	2,837	3,213	78,371	159	108	501	1,883	150	81,172
Apr.	44,744	28,487	1,951	485	842	1,158	1,728	1,583	3,647	84,625	201	308	318	1,085	188	86,725
May	28,011	22,036	2,833	909	561	815	1,648	2,507	3,118	62,438	120	175	284	1,160	229	64,406
June	28,048	24.428	3,693	625	693	643	2,441	3,904	4.776	69,251	198	110	353	809	150	70,871
July	25,055	35,035	3 861	601	482	937	2 057	4,710	5,139	77,877	126	311	371	722	223	79,630
Aug.	33,618	23.103	4,401	647	306	728	965	4,793	3,840	72.401	204	125	500	1,118	250	74,598
Sept.	30,485	20,167	3,964	829	212	284	756	3,893	8,139	68,729	150*	445	450*	828	250*	70,852

*Estimated. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

CONSOLIDATED OFFERS: HYDRAULIC PRESSES, Calenders, Mixers, Mills, Tubers, Driers, Vulcanizers, etc. Always a good deal on used machinery. Consolidated Products Co., Inc., 13-16 Park Row, New York City.

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MISCELLANEOUS

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ADVERTISING PAGES REMOVED

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	August, 1938		Eight Months Ended August, 1938	
UNMANUFACTURED—*Free*	Quantity	Value	Quantity	Value
Liquid latex (solids)...*lb.*	1,963,304	$308,573	18,001,346	$2,690,680
Jelutong or pontianak...*lb.*	1,177,372	159,784	14,679,825	2,241,603
Balata ...*lb.*	92,442	13,637	776,496	115,615
Jutta percha ...*lb.*	17,981	11,112	420,537	97,147
Guayule ...*lb.*	560,652	53,285	4,360,360	505,381
Siak ...*lb.*	8,960	898	147,298	17,358
Scrap and reclaimed...*lb.*	326,202	6,838	3,450,360	53,442
Totals ...	4,146,913	$554,127	41,836,222	$5,721,226
Misc. rubber (above), 1,000 *lbs.*	4,147	$554,127	41,836	$5,721,226
Crude rubber...1,000 *lbs.*	68,987	8,477,231	586,293	80,559,595
Totals ...1,000 *lbs.*	73,134	$9,031,358	628,129	$86,280,821
Chicle, crude ...*lb.*	225,014	62,580	6,227,324	1,861,373
MANUFACTURED—*Dutiable*				
Rubber tires ...*no.*	2,636	$4,105	15,539	$48,815
Rubber boots, shoes, and overshoes ...*prs.*	39	59	43,561	8,302
Rubber soled footwear with fabric uppers ...*prs.*	45,558	5,558	555,518	118,869
Golf balls ...*no.*	31,200	3,100	471,609	47,317
Lawn tennis balls...*no.*	25,824	3,968	468,152	47,395
Other rubber balls...*no.*	134,934	4,012	1,833,671	64,549
Other rubber toys...*lb.*	21,996	3,863	223,961	35,366
Hard rubber combs...*no.*	53,673	3,732	407,933	27,888
Other manufactures of hard rubber ...	.....	1,398	.....	11,556
Friction or insulating tape.*lb.*	10,000	562	62,527	3,468
Belts, hose, packing, and insulating material ...	.....	4,675	.....	47,017
Druggists' sundries of soft rubber ...	.....	4,537	.....	41,007
Inflatable swimming belts, floats, etc. ...*no.*	1,776	79	386,287	32,204
Other rubber and gutta percha manufactures...*lb.*	82,183	20,516	564,692	141,305
Totals ...	.....	$60,164	.....	$675,058

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber ...*lb.*	966,762	$133,350	7,592,335	$1,072,637
Balata ...*lb.*	28,091	8,496	319,764	95,247
Other rubber, rubber substitutes and scrap...*lb.*	.....	.....	100,660	14,311
Rubber manufactures (including toys) ...	.....	844	.....	8,467
Totals ...	.....	$142,690	.....	$1,190,662

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed ...*lb.*	1,248,033	$65,295	10,068,838	$551,682
Scrap ...*lb.*	3,502,809	96,837	38,858,356	672,542
Cements ...*gal.*	34,467	36,007	242,098	228,902
Rubberized auto cloth..*sq. yd.*	24,687	10,414	202,979	95,904
Other rubberized piece goods and hospital sheeting..*sq. yd.*	155,769	56,401	1,375,722	531,502
Boots ...*prs.*	4,178	8,448	58,362	126,642
Shoes ...*prs.*	4,777	3,705	155,405	79,979
Canvas shoes with rubber soles ...*prs.*	25,571	23,834	319,796	227,344
Heels ...*doz. prs.*	35,009	18,920	272,676	146,483
Soling and top lift sheets.*lb.*	39,408	6,680	250,433	47,049
Gloves and mittens..*doz. prs.*	6,668	15,233	62,040	129,805
Water bottles and fountain syringes ...*no.*	29,565	9,603	167,276	56,483
Other druggists' sundries...	.....	55,684	.....	376,986
Gum rubber clothing...*doz.*	30,345	53,608	225,747	425,616
Balloons ...*gross*	62,453	52,398	340,017	250,589
Toys and balls...	.....	17,800	.....	77,976
Bathing caps ...*doz.*	2,506	4,913	34,224	70,343
Bands ...*lb.*	11,263	4,229	163,265	63,363
Erasers ...*lb.*	21,692	10,955	212,501	118,193
Hard rubber goods				
Electrical battery boxes.*no.*	14,576	9,619	142,531	98,802
Other electrical ...*lb.*	22,744	5,632	251,796	54,790
Combs, finished ...*doz.*	11,878	6,245	151,878	63,438
Other hard rubber goods..	.....	11,518	.....	111,519
Tires				
Truck and bus casings..*no.*	15,277	305,782	148,797	2,894,995
Other auto casings...*no.*	41,402	489,679	392,485	4,120,779
Tubes, auto ...*no.*	34,932	56,308	349,093	577,474
Other casings and tubes..*no.*	4,216	48,518	48,357	401,023
Solid tires for automobiles and motor trucks...*no.*	90	2,219	1,973	55,366
Other solid tires...*lb.*	12,730	3,403	321,118	59,988
Tire sundries and repair materials ...	.....	61,104	.....	464,399
Rubber and friction tape..*lb.*	72,515	21,155	440,935	134,984
Fan belts for automobiles.*lb.*	43,045	22,838	354,989	187,043
Other rubber and balata belts ...*lb.*	196,414	111,647	1,907,853	978,983
Garden hose ...*lb.*	42,653	7,698	459,136	87,077
Other hose and tubing...*lb.*	431,209	173,559	2,961,309	1,136,924
Packing ...*lb.*	83,485	40,776	704,053	335,225
Mats, matting, flooring, and tiling ...*lb.*	76,741	15,117	594,106	93,832
Thread ...*lb.*	32,000	23,586	318,901	216,089
Gutta percha manufactures.*lb.*	180,996	55,320	663,005	209,885
Other rubber manufactures..	.....	114,003	.....	825,108
Totals ...	.....	$2,136,690	.....	$17,385,106

Rubber Goods Production Statistics

TIRES AND TUBES		1938 Aug.	1937 Aug.
Pneumatic casings:			
Production	*thousands*	4,093	3,983
Shipments, total	*thousands*	4,046	4,889
Stocks, end of month	*thousands*	8,330	10,813
Inner tubes:			
Production	*thousands*	3,815	3,885
Shipments, total	*thousands*	3,570	4,687
Stocks, end of month	*thousands*	7,808	10,144
Raw material consumed:			
Fabrics	*thous. of lbs.*	....	....
RUBBER AND CANVAS FOOTWEAR			
Production, total	*thous. of pairs*	4,254	6,454
Shipments, total	*thous. of pairs*	5,803	7,424
Stocks, total, end of month	*thous. of pairs*	17,897	20,746

The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Imports by Customs Districts

	—September, 1938— *Crude Rubber		—September, 1937— *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts ...	7,360,253	$1,132,336	9,928,483	$1,798,311
New York ...	61,327,618	8,508,846	88,245,144	15,622,663
Philadelphia ...	156,200	20,190	8,040,386	1,403,574
Maryland ...	1,829,408	219,029	5,997,338	1,065,990
Virginia ...	316,443	46,411	.....	.....
Georgia ...	904,157	108,199	158,811	26,390
Mobile ...	938,356	96,875	754	127
New Orleans ...	806,533	93,518	3,540,694	668,364
Galveston ...	22,400	2,877	44,800	8,456
Los Angeles ...	4,630,935	608,770	11,756,553	2,309,814
San Francisco ...	470,283	65,706	672,543	121,602
Oregon ...	15,680	2,330	.....	.....
Ohio ...	67,200	9,379	85,222	23,938
Colorado ...	89,600	8,837	.....	.....
Totals ...	78,935,066	$10,923,303	128,470,728	$23,049,229

*Crude rubber including latex dry rubber content.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
†8,179	Insulated cord ...	Surabaya, Java
†8,183	Office supplies ...	Brussels, Belgium
*8,190	Automobile accessories ...	Amsterdam, Netherlands
*8,191	Automobile and motorcycle parts...	Utrecht, Netherlands
*8,209	Toys ...	Brussels, Belgium
§8,227	Toys ...	Amsterdam, Netherlands
*8,229	Sporting goods ...	Manila, Philippine Islands
*8,243	Fountain pens ...	Paris, France
*8,245	Office supplies ...	London, England
*8,246	Fountain pens ...	London, England
*8,247	Toys ...	Buenos Aires, Argentina
*8,248	Surgical and hospital rubber goods...	Buenos Aires, Argentina
†8,251	Toys and athletic goods...	Manila, Philippine Islands
*8,256	Dress shields ...	Amsterdam, Netherlands
*8,295	Automobile spare parts and druggists' rubber sundries ...	Bogota, Colombia
*8,307	Fountain pens and suspenders...	Manila, Philippine Islands
*8,333	Automobile accessories and parts...	Cairo, Egypt
†8,338	Rubber boots and shoes...	Montevideo, Uruguay
*8,344	Rubberized raincoats ...	Athens, Greece
†8,347	Elastic mercerized cotton cord...	Barranquilla, Colombia
*8,355	Automobile accessories and parts...	Singapore, Straits Settlements
*8,364	Surgical rubber goods ...	Manila, Philippine Islands
†8,365	16-strand insulated battery cable...	London, Canada
‡8,369	Transmission cable ...	Wellington, New Zealand
‡8,380	Rubber raw materials ...	Eros-Cortenberg, Belgium
*8,381	Rubber and balata belting and sanitary rubber goods ...	Santiago, Chile
*8,382	Dolls ...	Alexandria, Egypt
†8,387	Heels for men's shoes...	Port-of-Spain, Trinidad
‡8,408	Fountain pens ...	Paris, France
*8,418	Rubber articles, especially toy balloons	Cairo, Egypt
†8,433	Surgical rubber goods ...	Oslo, Norway
*8,452	Druggists' rubber sundries...	Cairo, Egypt
*8,453	Druggists' rubber sundries...	Alexandria, Egypt
†8,505	Hospital sheeting, gloves, catheters, bougies, etc. ...	Klaipeda, Lithuania
†8,506	Spray and suction hose...	London, Canada
*8,507	Balloons, hot water bags, carpets, pants, toys, and gloves ...	Mexico City, Mexico
*8,508	Rubber footwear ...	Oslo, Norway
*8,521	Hospital rubber supplies, gloves, and sheeting ...	Bombay, India
‡8,531	Balloons ...	Singapore, Straists Settlements
*8,545	Sheet rubber ...	Capetown, South Africa

*Agency. †Purchase. ‡Purchase and agency. §Exclusive agency.